

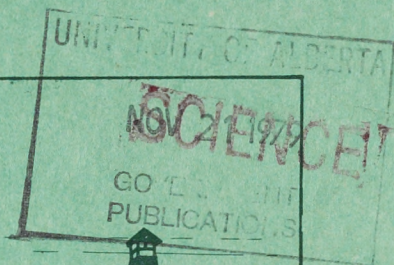
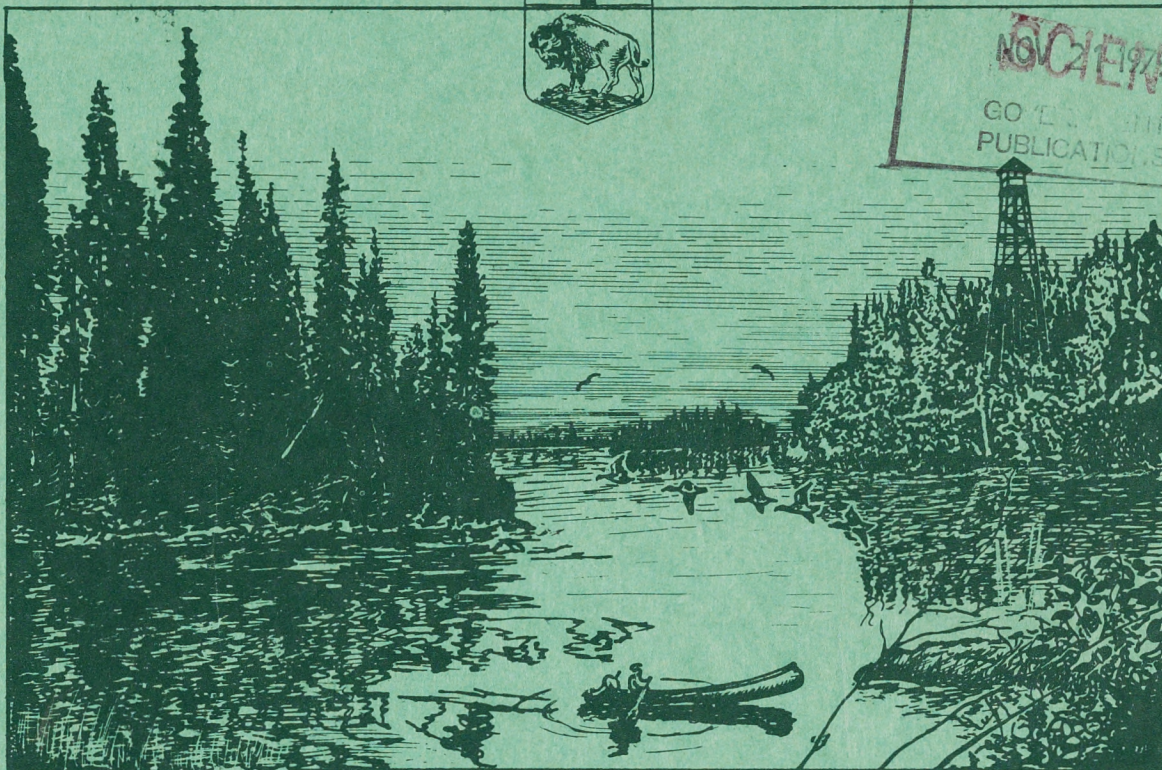
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Report No. 2

WINNIPEG RIVER FOREST SECTION



Forest Resources Inventory

—1956—



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Department of Mines and Natural Resources
PROVINCE OF MANITOBA

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Forest Resources Inventory

1956

Report No. 2

WINNIPEG RIVER FOREST SECTION



FOREST SERVICE

Department of Mines and Natural Resources

PROVINCE OF MANITOBA



Forest Resources Inventory Photograph of the Townsite of Pine Falls—Scale 4 inches to the mile.

Preface

This is one of a series of bulletins summarizing the results of the ground and aerial survey work which was completed in 1956 in connection with the latest Forest Inventory of Manitoba. The figures in this new series will replace those previously used based on surveys made between 1927 and 1930, and tabulated in "The Forests of Manitoba, Bulletin 85," published by the Dominion Forest Service in 1934.

For the purpose of the new Forest Inventory the Province has been divided (as shown on Map 1) into four zones based on climate, original vegetation and predicted future use, as follows:

| | |
|------------------------|--|
| Agricultural Forest | Transition from Forest to Tundra Tundra or Barren Lands |
|------------------------|--|

The Forest Zone may be defined as the area which is producing or is capable of producing forest crops and which for climatic reasons is, in the main, more suitable for the production of wood than for agricultural crops. The Forest Zone has an over-all area (omitting the three major lakes—Winnipeg, Manitoba and Winnipegosis) of about 113,238 square miles or nearly half the total area of Manitoba (less these lakes).

Based on the presence or absence of transportation routes such as railways, highways and water routes, the Forest Zone is again divided into an Accessible and Inaccessible Area.

The Accessible Forest Zone with an over-all area of about 64,122 square miles has been divided for Inventory purposes into seven main Forest Sections based on physical geography and administrative boundaries, as follows:

| | |
|--|---|
| Southeastern Winnipeg River Lowlands South Mountain | Lowlands North Nelson River Northern Mining |
|--|---|

Each of the Forest Sections is again divided into Working Circles which conform with Forest Ranger Districts, except in the more northerly areas where on account of their large size it has been necessary to subdivide the Ranger Districts. In addition to the seven major Forest Sections listed above, the Accessible Forest includes two minor areas in southern Manitoba—the Spruce Woods and the Turtle Mountain Forest Reserves.

The Inaccessible Forest with an over-all area of about 49,116 square miles has been divided into 20 Inventory Units.

Although a limited amount of the Forest Zone was inventoried before 1951, the main work was done commencing April 1st, 1951, from which date the Federal Government has reimbursed to the Province one-half of the expenditures incurred in forest resources inventory under the terms of an agreement with the Province pursuant to the provisions of the Canada Forestry Act.

A separate report will be published for each of the seven major Forest Sections of the Accessible Area, and an eighth report will cover the Spruce Woods and Turtle Mountain. The whole of the Inaccessible Forest will be covered by an additional report.

An explanation of the method of survey is given in the Appendix.

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PREPARED BY FOREST MANAGEMENT DIVISION

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Mechanical loading of Pulpwood.

Forest Resources

WINNIPEG RIVER FOREST SECTION

Location and Area

The Winnipeg River Forest Section includes the Whiteshell Forest Reserve, Blocks Nos. 1 and 2 of Pulpwood Berth No. 1, and some adjoining lands. The Forest Section is bounded on the north by the northern limits of Township 26 and on the east by the Ontario boundary. The shore line of Lake Winnipeg forms the western boundary except that Black Island is included. The Winnipeg River forms the boundary from its mouth to the Whiteshell Forest

Reserve, except that Fort Alexander Indian Reserve and the settlement north of the river in the Pine Falls Ranger District is excluded. In the south, the Whiteshell Forest Reserve boundary is used except for an additional township and a half outside the Reserve which forms part of the Rennie Ranger District. The total area covered by this report is 2,855,214 acres. This area excludes Indian Reserve lands but includes all other areas of Crown and patented land within the boundaries hatched on Map No. 2.

Table 1
Area Classification—Winnipeg River Forest Section

| Class of area | Crown land | | Patented land | | Total | |
|-------------------------------------|------------------|----------------|---------------|----------------|------------------|----------------|
| | acres | % of land area | acres | % of land area | acres | % of land area |
| Productive forest land* | 1,321,720 | 51.3 | 12,088 | 47.2 | 1,333,808 | 51.2 |
| Potentially productive forest land† | 344,502 | 13.4 | 4,372 | 17.1 | 348,874 | 13.4 |
| Nonproductive forest‡ | 518,327 | 20.1 | 1,363 | 5.3 | 519,690 | 20.0 |
| Permanently nonforested land* | 393,804 | 15.2 | 7,815 | 30.4 | 401,619 | 15.4 |
| TOTAL LAND | 2,578,353 | 100.0 | 25,638 | 100.0 | 2,603,991 | 100.0 |
| WATER | 250,659 | 9.7 | 564 | 2.2 | 251,223 | 9.6 |
| TOTAL AREA | 2,829,012 | | 26,202 | | 2,855,214 | |

*Land supporting merchantable timber or young growth which will produce merchantable timber within a reasonable time.

†Cut over, burn, brush or grassland, not now supporting productive forest, but capable of doing so.

‡Land with a forest cover such as treed muskeg, treed rock, and willow or alder swamp, but incapable of producing a forest crop of merchantable size within a reasonable time.

*Includes marsh, muskeg, rock, meadow, developed agricultural land, urban areas, roads and railroads. In general, lands not expected to produce forest of any kind.

Geology

Since the area is part of the Canadian Shield, the underlying rock is of Precambrian age (except on Black Island which is mainly Ordovician). The main body of the rock is made up largely of granite and granite-like rocks formed from the molten state at great depths. Included with the granite are relatively narrow, subparallel belts of altered sediments and lavas which are the remnants of rocks which in very ancient times covered the surface. These ancient rocks were folded into mountain ranges and were intruded or largely replaced by

the granite, following which the mountain ranges by long process of erosion were worn down to their roots, now exposed as the belts of lavas and sediments contained within the granites. These belts of volcanic and sedimentary rock are of economic interest on account of the mineral deposits found in them. To date only gold has been produced from the mineral deposits in the area; however, economically interesting occurrences of chromium, copper, nickel, lithium and beryllium are known to be present within this region. Many of these occurrences have been explored and developed to the point where future production is possible.

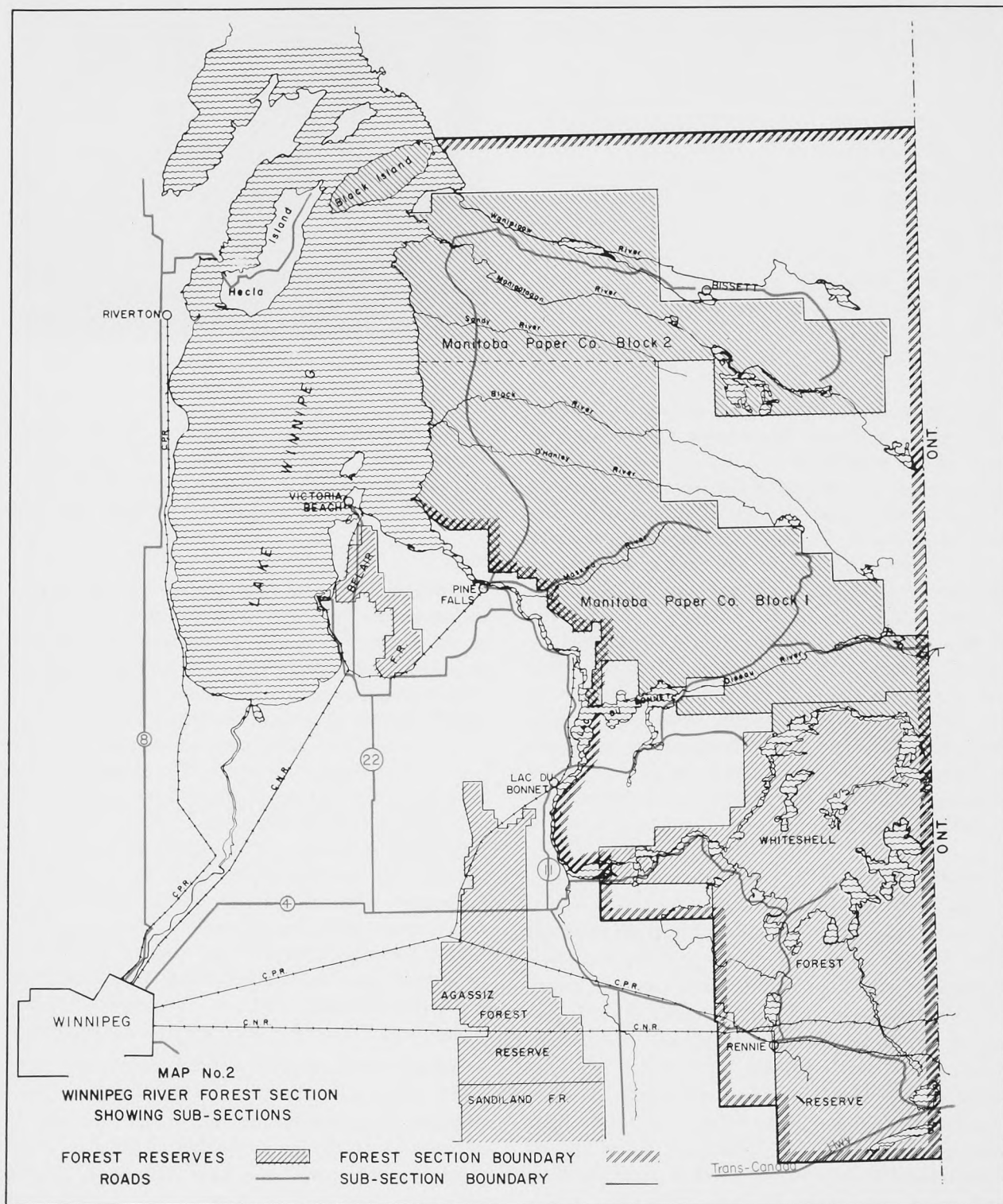


Table 2

Classification of Productive Forest Land by Cover Types and Tenure—Winnipeg River Forest Section

| Cover type | Crown land | | Patented land | | Total | |
|-------------------------------|------------------|------------|---------------|------------|------------------|------------|
| | acres | % | acres | % | acres | % |
| S: Over 75% softwood..... | 843,331 | 64 | 3,987 | 33 | 847,318 | 64 |
| M: 50 - 75% softwood..... | 211,535 | 16 | 4,832 | 40 | 216,367 | 16 |
| N: 25 - 50% softwood..... | 98,701 | 7 | 299 | 2 | 99,000 | 7 |
| H: Under 25% softwood..... | 168,153 | 13 | 2,970 | 25 | 171,123 | 13 |
| TOTAL..... | 1,321,720 | 100 | 12,088 | 100 | 1,333,808 | 100 |

The advance of the ice-sheet during the Pleistocene epoch modified the surface by removal of much of the weathered rock and by smoothing out the outcrops. The retreat of the ice-sheet deposited ground moraine over the whole surface. The ice-sheet is believed to have remained on the area until a comparatively late date and erosion since that time has affected only the tops of the more exposed ridges. Glacial Lake Agassiz affected the western portion to a slight extent as evidenced by lacustrine soils along the lower Winnipeg River and along the shore of Lake Winnipeg north of the river. An examination of aerial photographs shows no evidence of prominent eskers, moraines or glacial lake beaches although small deposits of gravel in the form of kames are found in the process of road construction.

Topography

This area like so much of the Canadian Shield has no conspicuous topographical features although there is much local relief. In general, the surface is hummocky with innumerable lakes, many of which are rock basins, others being the result of the blocking of old river channels by glacial debris. The rivers and streams consist of stretches of quiet water or lake-like expansions separated by sharp rapids. The drainage of the whole area is into Lake Winnipeg by way of the Winnipeg River and its tributaries—the Whiteshell, Oiseau, and Maskwa; and going northward, by the O'Hanley, Black, Sandy, Manigotogan, Wanipigow and the upper reaches of the Bloodvein.



Pine Falls Ranger Station.

The highest recorded elevation in this Forest Section is at a point on the Ontario border, east of Oiseau Lake, which is 1,230 feet above sea level, while the lowest is at Lake Winnipeg, 713 feet.

Soils

Although there is a considerable amount of bare rock exposure, also of rock with a thin layer of soil in the Precambrian, the percentage of land area incapable of growing productive forests on account of lack of soil is not unduly high. Bare rock occurs only on the top of some of the ridges and along some of the rivers and lake margins where there has been recent erosion by water. The slopes and hollows have soil varying in depth from sufficient for tree growth to quite deep. As a matter of fact, the proportion of land area incapable of timber production due to dryness is much lower than the proportion which is too wet. The Forest Inventory area classification for the whole Winnipeg River Forest Section shows 10.4 per cent of the land to be in the "Rock" and "Treed Rock" types, while the wet types—"Muskeg," "Marsh," "Meadow," "Willow-Alder" and "Treed Muskeg" occupy 24.0 per cent.

Only a small amount of soil survey has been carried out in this Section but most of the upland soil may be described as till. There are alluvial deposits along the lower reaches of the rivers, and some lacustrine soils near Lake Winnipeg. Lacustrine clay soils have also been noted in the Whiteshell which may be Lake Agassiz deposits or possibly have originated in local postglacial lakes.

Areas of organic soil are quite extensive especially in the lower or western portion of the Section. Some of these organic or peat soils are producing good black spruce while the wetter portions are covered with stagnated spruce, classed as nonproductive forest; or open muskeg, classed as nonforested.

Soil scientists formerly classified this whole Forest Section as podzol, but the modern concept is that the soils in the well drained position produce podzols where the parent material is largely siliceous, and brown podzolic soils where the parent material has sufficient iron content to stain the soil brown to the depth of active leaching.

Climate and Natural Vegetation

Weather observations in this area have not been kept at any one station for a sufficiently long period to give a very accurate record. However, some records are available from Pinawa and Bissett, and

using these stations and other stations in adjoining areas, the meteorological Division of the Department of Transport have prepared a Climatological Atlas which gives approximately correct information.

The average annual precipitation is from 20 to 23 inches, and a large percentage falls in the form of rain in the months of June and July. Since most of the annual growth of vegetation takes place during these two months the temperature records for this period are of interest. The Pinawa record for 22 years shows an average mean daily maximum temperature for July of 77 degrees. The January mean daily minimum for the same station and period was 14 degrees below zero. The average length of the period free from killing frost, taken at 29.5 degrees, is approximately 119 to 125 days, the shortest period being in the northeast. Comparison may be made with Winnipeg where weather records have been kept continuously since

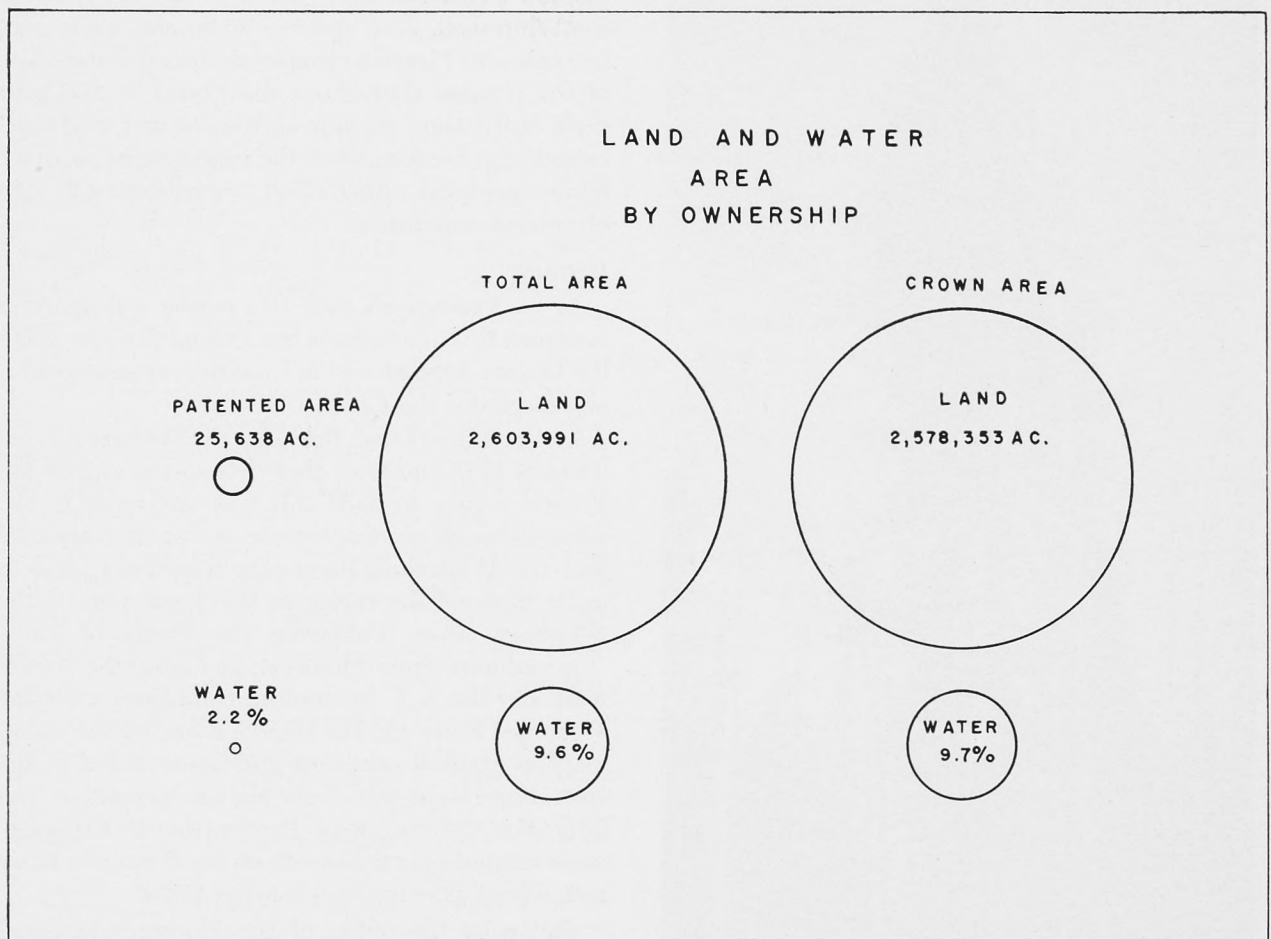


Figure 1.

1872; this comparison shows that Pinawa is one degree colder in January and two degrees cooler in July, while the growing season at Pinawa is about six days shorter.

The Winnipeg River Forest Section corresponds approximately with the Manitoba portion of the English River Section, B14, as mapped in "A Forest Classification for Canada." Although it forms part of the Boreal Forest Region as indicated by the predominance of spruce, jack pine, and poplar—due to its proximity to the Great Lakes Forest Region minor occurrences of some eastern tree species are found. Some white pine and cedar occurs in the southern part of the Whiteshell Forest Reserve; red pine is found isolated in a small stand at the north end of Black Island in Lake Winnipeg. Black ash grows to saw log size in a few places in the

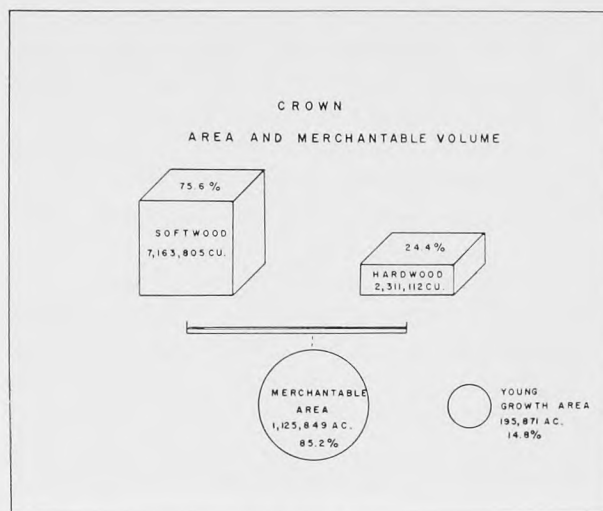


Figure 2.



White Spruce in mixed stand.

Whiteshell and further north; hop hornbeam has been found occasionally in the Whiteshell; large-toothed aspen has been noted in several spots in the Whiteshell. Four species—white elm, green ash, bur oak, and Manitoba maple are found along some of the streams throughout the Forest Section and their distribution extends northward and westward beyond the Section. Since the total volume of these minor species is rather small, no separate estimate of volume was made.

History

In La Verendrye's time this region was sparsely occupied by Cree Indians but around the year 1800, the Ojibwa tribe moved in from the east and gradually displaced the Crees.

La Verendrye's men first used the Winnipeg River route in 1732 and from that date to the end of the French regime in 1763 this was the route to the west, although old maps made at this time indicate that the Whiteshell River was sometimes used in order to avoid the rapids in the upper part of the Winnipeg River. Following the Treaty of Paris, "the peddlers" from Montreal, and later, the Northwest and the X.Y. fur-trading companies used the Winnipeg River and the Pinawa River for the movement of trade goods west and bales of fur to the east. Fort Maurepas built by La Verendrye and later Fort Alexander of the Northwest Company were located near the mouth of the Winnipeg River and served as pemmican transfer posts.

Following the union of the Hudson's Bay and Northwest Companies in 1821 the main freight

route for the fur company was shifted to the Hayes River-York Factory route. The purchase of Rupertsland from the Hudson's Bay Company in 1869 revived interest in the Winnipeg River route, and the Wolsley expedition went this way when troops were sent west to suppress the first Riel Rebellion. Railway development soon followed and the Canadian Pacific Railway, crossing what is now the Whiteshell Forest Reserve, was completed between Winnipeg and Fort William in 1880.

Development of the Area

With the construction of the Canadian Pacific Railway, modern development may be said to have commenced. A second transcontinental railway, later known as the Canadian National, crossed the Whiteshell area in 1907. The C.P.R. completed a branch line to Lac du Bonnet in 1901 which was extended to Great Falls in 1914, while the C.N.R. completed a line to Pine Falls in 1926.

Table 3

Area Classification of Productive Forest by Age Classes, Cover Types and Merchantability—Winnipeg River Forest Section

| AGE CLASS <i>years</i> | COVER TYPES IN ACRES | | | | | | | | | |
|---------------------------|----------------------|---------|----------|---------|----------|--------|----------|---------|-----------|-----------|
| | S | | M | | N | | H | | Total | |
| | Unmerch. | Merch. | Unmerch. | Merch. | Unmerch. | Merch. | Unmerch. | Merch. | Unmerch. | Merch. |
| CROWN LANDS | | | | | | | | | | |
| 0 - 20..... | 136,288 | ..... | 22,895 | ..... | 1,436 | ..... | 9,424 | ..... | 170,043 | ..... |
| 21 - 40..... | 8,894 | 59,430 | 2,035 | 13,635 | ..... | 19,541 | 3,579 | 10,268 | 14,508 | 102,874 |
| 41 - 60..... | 10,425 | 87,473 | 874 | 88,407 | 21 | 46,756 | ..... | 92,425 | 11,320 | 315,061 |
| 61 - 80..... | ..... | 357,102 | ..... | 60,084 | ..... | 28,241 | ..... | 40,166 | ..... | 485,593 |
| 81 - 100..... | ..... | 138,395 | ..... | 18,472 | ..... | 2,617 | ..... | 11,501 | ..... | 170,985 |
| 101 - over..... | ..... | 45,324 | ..... | 5,133 | ..... | 89 | ..... | 790 | ..... | 51,336 |
| SUBTOTAL..... | 155,607 | 687,724 | 25,804 | 185,731 | 1,457 | 97,244 | 13,003 | 155,150 | 195,871 | 1,125,849 |
| TOTAL..... | 843,331 | | 211,535 | | 98,701 | | 168,153 | | 1,321,720 | |
| PATENTED LANDS | | | | | | | | | | |
| 0 - 20..... | 1,254 | ..... | 3,599 | ..... | ..... | ..... | 1,639 | ..... | 6,492 | ..... |
| 21 - 40..... | 215 | 207 | ..... | 861 | ..... | 291 | ..... | 269 | 215 | 1,628 |
| 41 - 60..... | 508 | 910 | ..... | 321 | ..... | 3 | ..... | 424 | 508 | 1,658 |
| 61 - 80..... | ..... | 189 | ..... | 51 | ..... | 5 | ..... | 612 | ..... | 857 |
| 81 - 100..... | ..... | 704 | ..... | ..... | ..... | ..... | ..... | 26 | ..... | 730 |
| 101 - over..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| SUBTOTAL..... | 1,977 | 2,010 | 3,599 | 1,233 | ..... | 299 | 1,639 | 1,331 | 7,215 | 4,873 |
| TOTAL..... | 3,987 | | 4,832 | | 299 | | 2,970 | | 12,088 | |
| ALL LANDS | | | | | | | | | | |
| 0 - 20..... | 137,542 | ..... | 26,494 | ..... | 1,436 | ..... | 11,063 | ..... | 176,535 | ..... |
| 21 - 40..... | 9,109 | 59,637 | 2,035 | 14,496 | ..... | 19,832 | 3,579 | 10,537 | 14,723 | 104,502 |
| 41 - 60..... | 10,933 | 88,383 | 874 | 88,728 | 21 | 46,759 | ..... | 92,849 | 11,828 | 316,719 |
| 61 - 80..... | ..... | 357,291 | ..... | 60,135 | ..... | 28,246 | ..... | 40,778 | ..... | 486,450 |
| 81 - 100..... | ..... | 139,099 | ..... | 18,472 | ..... | 2,617 | ..... | 11,527 | ..... | 171,715 |
| 101 - over..... | ..... | 45,324 | ..... | 5,133 | ..... | 89 | ..... | 790 | ..... | 51,336 |
| SUBTOTAL..... | 157,584 | 689,734 | 29,403 | 186,964 | 1,457 | 97,543 | 14,642 | 156,481 | 203,086 | 1,130,722 |
| TOTAL..... | 847,318 | | 216,367 | | 99,000 | | 171,123 | | 1,333,808 | |

CROWN AREA
DISTRIBUTED INTO LAND
CLASSES

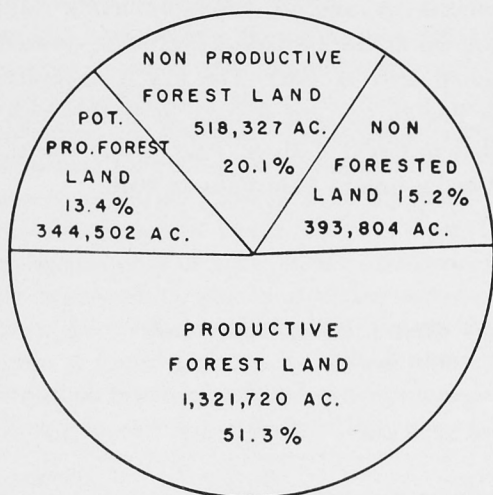


Figure 3.

Old records show that sawmills operated along the east shore of Lake Winnipeg as far north as the mouth of the Wanipigow River as early as 1879, indeed, the firm of Dick and Banning had a year's cut of 480,000 ft. b.m. at that point. Other early operators on Lake Winnipeg and the Winnipeg River were Walkley and Burrows, Brouse and Co., and Drake and Rutherford. Rough lumber was made into rafts or transported on barges to the Red River where it was planed and finished.

The Winnipeg River was recognized as a good timber area at an early date, and a number of mills produced lumber at Pine Falls and other points. Some of the early mills used water power and some of the later mills used electricity. J. D. McArthur who lumbered in this district saw its capacity for pulp and paper production and in 1921 secured a pulpwood berth along the north shore of the river. This led to the building of a pulp and paper mill

CROWN
PRODUCTIVE FOREST LAND
BY COVER TYPE AND MERCHANTABILITY
TOTAL AREA 1,321,720 ACRES

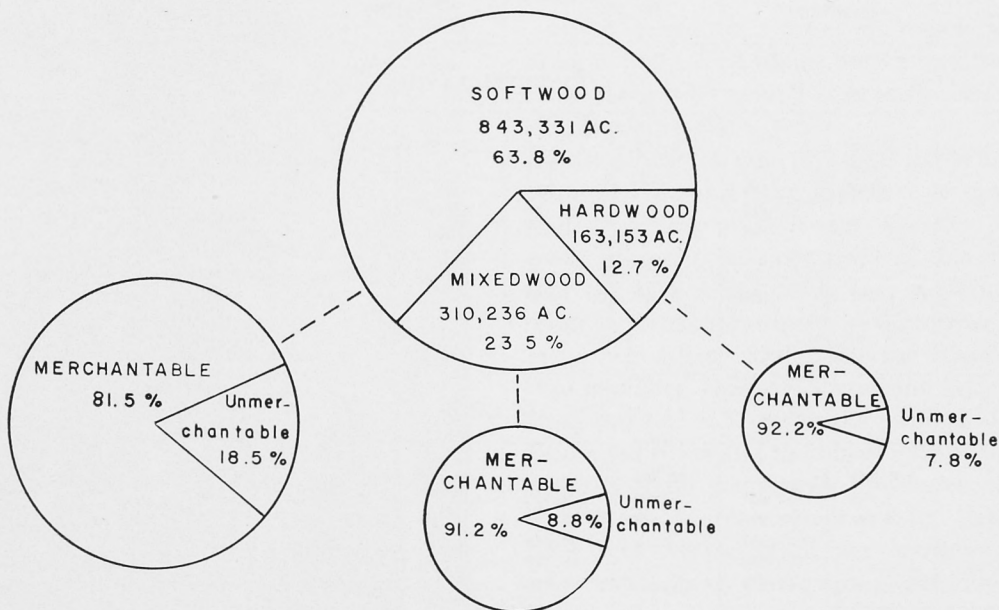


Figure 4.

Table 4
Softwood and Hardwood Volume by Age Classes and Cover Types—
Winnipeg River Forest Section

| *VOLUME IN CUNITS BY COVER TYPE (1 Cunit equals 100 cubic feet of wood) | | | | | | | | | | | | | | | |
|---|-----------|----------|-----------|-----------|----------|-----------|----------|----------|---------|----------|-----------|-----------|-----------|-----------|-----------|
| Age class years | S | | | M | | | N | | | H | | | Total | | |
| | Softwood | Hardwood | Total | Softwood | Hardwood | Total | Softwood | Hardwood | Total | Softwood | Hardwood | Total | Softwood | Hardwood | Total |
| | | | | | | | | | | | | | | | |
| CROWN LANDS | | | | | | | | | | | | | | | |
| 0 - 20..... | 98,664 | 7,534 | 106,198 | 28,310 | 11,894 | 40,204 | 38,128 | 38,639 | 76,767 | 3,523 | 22,567 | 26,090 | 168,625 | 80,634 | 249,259 |
| 21 - 40..... | 582,441 | 66,663 | 649,104 | 636,092 | 332,680 | 968,772 | 227,981 | 157,364 | 385,345 | 115,092 | 634,282 | 749,374 | 1,561,606 | 1,190,989 | 2,752,595 |
| 41 - 60..... | 2,586,511 | 193,036 | 2,779,547 | 365,894 | 123,341 | 489,235 | 135,196 | 138,767 | 263,963 | 73,648 | 318,385 | 391,933 | 3,161,249 | 763,429 | 3,924,678 |
| 61 - 80..... | 1,540,022 | 55,071 | 1,595,093 | 157,762 | 59,312 | 217,074 | 14,303 | 13,227 | 27,530 | 30,202 | 116,230 | 146,432 | 1,742,289 | 243,840 | 1,986,129 |
| 81 - 100..... | 499,590 | 16,449 | 516,039 | 27,991 | 9,834 | 37,825 | 1,048 | 690 | 1,738 | 1,407 | 5,247 | 6,654 | 530,036 | 32,220 | 562,256 |
| 101 - over..... | | | | | | | | | | | | | | | |
| TOTAL..... | 5,307,228 | 338,753 | 5,645,981 | 1,216,049 | 537,061 | 1,753,110 | 416,656 | 338,687 | 755,343 | 223,872 | 1,096,611 | 1,320,483 | 7,163,805 | 2,311,112 | 9,474,917 |
| PATENTED LANDS | | | | | | | | | | | | | | | |
| 0 - 20..... | | | | | | | | | | | | | | | |
| 21 - 40..... | 601 | 40 | 641 | 680 | 240 | 920 | 934 | 1,235 | 2,169 | 37 | 331 | 368 | 2,252 | 1,846 | 4,098 |
| 41 - 60..... | 19,599 | 1,288 | 20,887 | 1,412 | 462 | 1,874 | 9 | 12 | 21 | 354 | 1,602 | 1,956 | 21,374 | 3,364 | 24,738 |
| 61 - 80..... | 667 | 46 | 713 | 579 | 297 | 876 | 55 | 37 | 92 | 1,591 | 5,853 | 7,444 | 2,892 | 6,233 | 9,125 |
| 81 - 100..... | 1,276 | 9 | 1,285 | | | | | | | 75 | 256 | 331 | 1,351 | 265 | 1,616 |
| 101 - over..... | | | | | | | | | | | | | | | |
| TOTAL..... | 22,143 | 1,383 | 23,526 | 2,671 | 999 | 3,670 | 998 | 1,284 | 2,282 | 2,057 | 8,042 | 10,099 | 27,869 | 11,708 | 39,577 |
| ALL LANDS | | | | | | | | | | | | | | | |
| 0 - 20..... | | | | | | | | | | | | | | | |
| 21 - 40..... | 99,265 | 7,574 | 106,839 | 28,990 | 12,134 | 41,124 | 39,062 | 39,874 | 78,936 | 3,560 | 22,898 | 26,458 | 170,877 | 82,480 | 253,357 |
| 41 - 60..... | 602,040 | 67,951 | 669,991 | 637,504 | 333,142 | 970,646 | 227,990 | 157,376 | 385,366 | 113,446 | 635,884 | 751,330 | 1,582,980 | 1,194,953 | 2,777,333 |
| 61 - 80..... | 2,587,178 | 193,082 | 2,780,260 | 366,473 | 123,638 | 490,111 | 135,251 | 128,804 | 264,055 | 75,239 | 324,138 | 399,377 | 3,164,141 | 769,662 | 3,933,803 |
| 81 - 100..... | 1,541,298 | 55,080 | 1,596,378 | 157,762 | 59,312 | 217,074 | 14,303 | 13,227 | 27,530 | 30,277 | 116,486 | 146,763 | 1,743,640 | 244,105 | 1,987,745 |
| 101 - over..... | 499,590 | 16,449 | 516,039 | 27,991 | 9,834 | 37,825 | 1,048 | 690 | 1,738 | 1,407 | 5,247 | 6,654 | 530,036 | 32,220 | 562,256 |
| TOTAL..... | 5,329,371 | 340,136 | 5,669,507 | 1,218,720 | 538,060 | 1,756,780 | 417,654 | 339,971 | 757,625 | 225,929 | 1,104,653 | 1,330,582 | 7,191,674 | 2,322,820 | 9,514,494 |

*Net roundwood volume: stump height 1', top diameter 3"; one stacked cord equals approximately 85 cubic feet of wood.

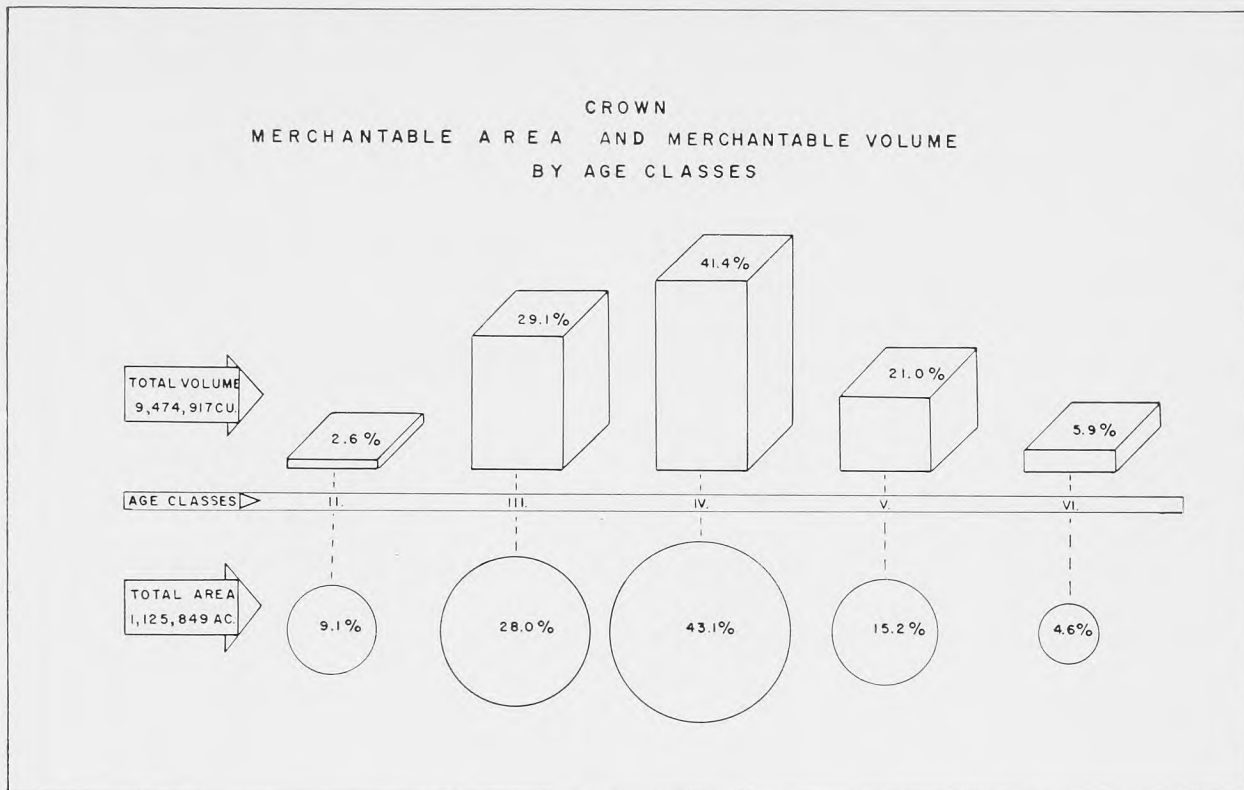


Figure 5.



Pulpwood drive on Maskwa River.

Photo courtesy Canadian Broadcasting Corporation

which commenced production in February, 1927, at Pine Falls. This industry now operating under the name, Manitoba Paper Company Limited, has at present a daily capacity of 500 tons of newsprint paper. The pulpwood berth which formerly consisted of a large number of blocks scattered over a wide area was consolidated in 1953 into four blocks with an area of 2,848 square miles. Blocks 1 and 3 with areas of 1,133 and 744 square miles, respectively, are located within the Winnipeg River Forest Section.

There has been very little agricultural development within this Forest Section, and less than one per cent of the land area is privately owned. Farms have been developed on a narrow strip of clay land north of the Winnipeg River opposite St. George, and there are similar strips along the Oiseau River, the Pinawa Channel, and on the east side of the Winnipeg River opposite Lac du Bonnet. Manigo-

togan has a small settlement laid out in river lots, and there is some arable land on the Fort Alexander, Black River and Hole River Indian Reserves which could possibly be developed. Soil surveys to date indicate that outside the areas mentioned above, any other agricultural areas found will be too small to warrant the establishment of an agricultural community.

The mining boom of the 1890's opened up the Whiteshell area to prospecting for gold and other minerals. Gold was discovered on the Wanipigow watershed in 1911, and this led to the development of a number of producing gold mines on this and on the adjoining Manigotogan watershed. One of these mines, the San Antonio, has operated continuously from 1932 to the present time. The Oiseau and Winnipeg River areas have recently been intensively explored for lithium, beryllium, copper

Table 5
Softwood and Hardwood Volume by Cover Types and Size Classes—
Winnipeg River Forest Section

| Cover type | VOLUME IN CUNITS (100 cu. ft. Units) | | | | | | | | |
|----------------|--------------------------------------|-----------|-----------|-----------|---------|-----------|-----------|-----------|-----------|
| | Softwood | | | Hardwood | | | Total | | |
| | 4" - 9" | 10" + | Total | 4" - 9" | 10" + | Total | 4" - 9" | 10" + | Total |
| CROWN LANDS | | | | | | | | | |
| S..... | 4,150,587 | 1,156,641 | 5,307,228 | 248,115 | 90,638 | 338,753 | 4,398,702 | 1,247,279 | 5,645,981 |
| M..... | 792,418 | 423,631 | 1,216,049 | 321,587 | 215,474 | 537,061 | 1,114,005 | 639,105 | 1,753,110 |
| N..... | 289,587 | 127,069 | 416,656 | 212,463 | 126,224 | 338,687 | 502,050 | 253,293 | 755,343 |
| H..... | 182,460 | 41,412 | 223,872 | 577,741 | 518,870 | 1,096,611 | 760,201 | 560,282 | 1,320,483 |
| TOTAL..... | 5,415,052 | 1,748,753 | 7,163,805 | 1,359,906 | 951,206 | 2,311,112 | 6,774,958 | 2,699,959 | 9,474,917 |
| PATENTED LANDS | | | | | | | | | |
| S..... | 15,388 | 6,755 | 22,143 | 749 | 634 | 1,383 | 16,137 | 7,389 | 23,526 |
| M..... | 1,831 | 840 | 2,671 | 683 | 316 | 999 | 2,514 | 1,156 | 3,670 |
| N..... | 585 | 413 | 998 | 738 | 546 | 1,284 | 1,323 | 959 | 2,282 |
| H..... | 1,306 | 751 | 2,057 | 4,681 | 3,361 | 8,042 | 5,987 | 4,112 | 10,099 |
| TOTAL..... | 19,110 | 8,759 | 27,869 | 6,851 | 4,857 | 11,708 | 25,961 | 13,616 | 39,577 |
| ALL LANDS | | | | | | | | | |
| S..... | 4,165,975 | 1,163,396 | 5,329,371 | 248,864 | 91,272 | 340,136 | 4,414,839 | 1,254,668 | 5,669,507 |
| M..... | 794,249 | 424,471 | 1,218,720 | 322,270 | 215,790 | 538,060 | 1,116,519 | 640,261 | 1,756,780 |
| N..... | 290,172 | 127,482 | 417,654 | 213,201 | 126,770 | 339,971 | 503,373 | 254,252 | 757,625 |
| H..... | 183,766 | 42,163 | 225,929 | 582,422 | 522,231 | 1,104,653 | 766,188 | 564,394 | 1,330,582 |
| TOTAL..... | 5,434,162 | 1,757,512 | 7,191,674 | 1,366,757 | 956,063 | 2,322,820 | 6,800,919 | 2,713,575 | 9,514,494 |



Figure 6.

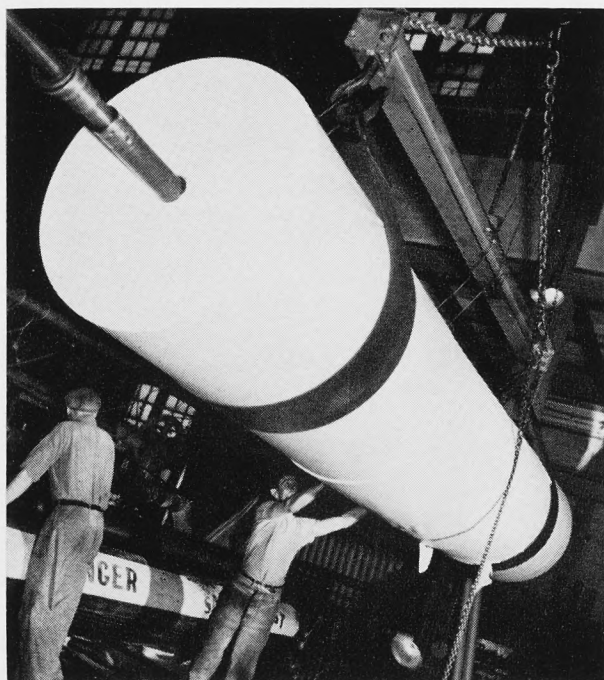


Photo courtesy Manitoba Government, Dept. of Industry and Commerce
Newsprint paper, full length roll, Manitoba Paper Company
Limited.

and nickel; and several of these mines are near the production stage.

The first hydro-electric development on the Winnipeg River took place in 1906 when the Pinawa plant was opened. This plant was followed by others; the last plant, McArthur Falls, coming into operation in 1955. The Winnipeg River is now fully developed as far as Manitoba is concerned, the six plants having a total rated capacity of 570,000 kilowatts, or 763,000 horsepower.

This region of forest, lake, and river has been of importance for its fur production since early days. Unrestricted trapping after the opening of settlement in adjoining areas, however, depleted the population of fur-bearing animals almost to the vanishing point. The whole Winnipeg River Forest Section is now under trapline management and the establishment of this registered trapline system has gradually built up the numbers of fur bearers, especially of beaver. This is exemplified by the increase in the annual beaver production in the Whiteshell which has risen from 125 pelts in 1941-42 to 836 in 1955-56. Fur products taken in the

Table 6
*Softwood and Hardwood Volume by Species and Size Classes—
Winnipeg River Forest Section*

| Species | *CUNITS BY DIAMETER CLASSES | | | | | | † SAW TIMBER |
|------------------------|-----------------------------|----------|----------------|----------|--------------|----------|--------------|
| | Total | | 4" - 9" D.B.H. | | 10" + D.B.H. | | 10" and Over |
| | volume | per cent | volume | per cent | volume | per cent | M ft. b.m. |
| CROWN LANDS | | | | | | | |
| White spruce..... | 1,712,516 | 18 | 858,097 | 13 | 854,419 | 32 | 384,489 |
| Black spruce..... | 2,011,744 | 21 | 1,892,191 | 28 | 119,553 | 4 | 53,799 |
| Balsam fir..... | 832,564 | 9 | 688,519 | 10 | 144,045 | 5 | 64,820 |
| Jack pine..... | 2,585,912 | 26 | 1,956,041 | 29 | 629,871 | 23 | 283,442 |
| Tamarack..... | 20,356 | 2 | 19,493 | ..... | 863 | ..... | 388 |
| Cedar..... | 713 | ..... | 711 | ..... | 2 | ..... | 1 |
| TOTAL SOFTWOOD..... | 7,163,805 | 76 | 5,415,052 | 80 | 1,748,753 | 64 | 786,939 |
| Aspen..... | 1,876,468 | 19 | 1,067,710 | 16 | 808,758 | 30 | 363,941 |
| Balsam poplar..... | 176,560 | 2 | 79,982 | 1 | 96,578 | 4 | 43,460 |
| White birch..... | 258,084 | 3 | 212,214 | 3 | 45,870 | 2 | 20,642 |
| TOTAL HARDWOOD..... | 2,311,112 | 24 | 1,359,906 | 20 | 951,206 | 36 | 428,043 |
| TOTAL ALL SPECIES..... | 9,474,917 | 100 | 6,774,958 | 100 | 2,699,959 | 100 | 1,214,982 |
| PATENTED LANDS | | | | | | | |
| White spruce..... | 1,903 | 5 | 1,064 | 4 | 839 | 6 | 378 |
| Black spruce..... | 16,214 | 42 | 11,105 | 43 | 5,109 | 37 | 2,299 |
| Balsam fir..... | 2,035 | 5 | 1,533 | 6 | 502 | 4 | 226 |
| Jack pine..... | 7,664 | 19 | 5,361 | 21 | 2,303 | 17 | 1,036 |
| Tamarack..... | 53 | ..... | 47 | ..... | 6 | ..... | 3 |
| Cedar..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| TOTAL SOFTWOOD..... | 27,869 | 71 | 19,110 | 74 | 8,759 | 64 | 3,942 |
| Aspen..... | 9,268 | 23 | 5,273 | 20 | 3,995 | 29 | 1,798 |
| Balsam poplar..... | 872 | 2 | 395 | 1 | 477 | 4 | 215 |
| White birch..... | 1,568 | 4 | 1,183 | 5 | 385 | 3 | 173 |
| TOTAL HARDWOOD..... | 11,708 | 29 | 6,851 | 26 | 4,857 | 36 | 2,186 |
| TOTAL ALL SPECIES..... | 39,577 | 100 | 25,961 | 100 | 13,616 | 100 | 6,128 |
| ALL LANDS | | | | | | | |
| White spruce..... | 1,714,419 | 18 | 859,161 | 13 | 855,258 | 32 | 384,867 |
| Black spruce..... | 2,027,958 | 21 | 1,903,296 | 28 | 124,662 | 5 | 56,098 |
| Balsam fir..... | 834,599 | 9 | 690,052 | 10 | 144,547 | 5 | 65,046 |
| Jack pine..... | 2,593,576 | 27 | 1,961,402 | 29 | 632,174 | 23 | 284,478 |
| Tamarack..... | 20,409 | ..... | 19,540 | ..... | 869 | ..... | 391 |
| Cedar..... | 713 | ..... | 711 | ..... | 2 | ..... | 1 |
| TOTAL SOFTWOOD..... | 7,191,674 | 75 | 5,434,162 | 80 | 1,757,512 | 65 | 790,881 |
| Aspen..... | 1,885,736 | 20 | 1,072,983 | 16 | 812,753 | 30 | 365,739 |
| Balsam poplar..... | 177,432 | 2 | 80,377 | 1 | 97,055 | 3 | 43,675 |
| White birch..... | 259,652 | 3 | 213,397 | 3 | 46,255 | 2 | 20,815 |
| TOTAL HARDWOOD..... | 2,322,820 | 25 | 1,366,757 | 20 | 956,063 | 35 | 430,229 |
| TOTAL ALL SPECIES..... | 9,514,494 | 100 | 6,800,919 | 100 | 2,713,575 | 100 | 1,221,110 |

†Saw timber figures were obtained by converting the cubic foot volume of the size class, 10" D.B.H. and over, to Board feet on the assumption that one cubic foot is equal to 4.5 board feet.

*One cunit equals 100 cubic feet of wood; one cord equals 85 cubic feet of wood.

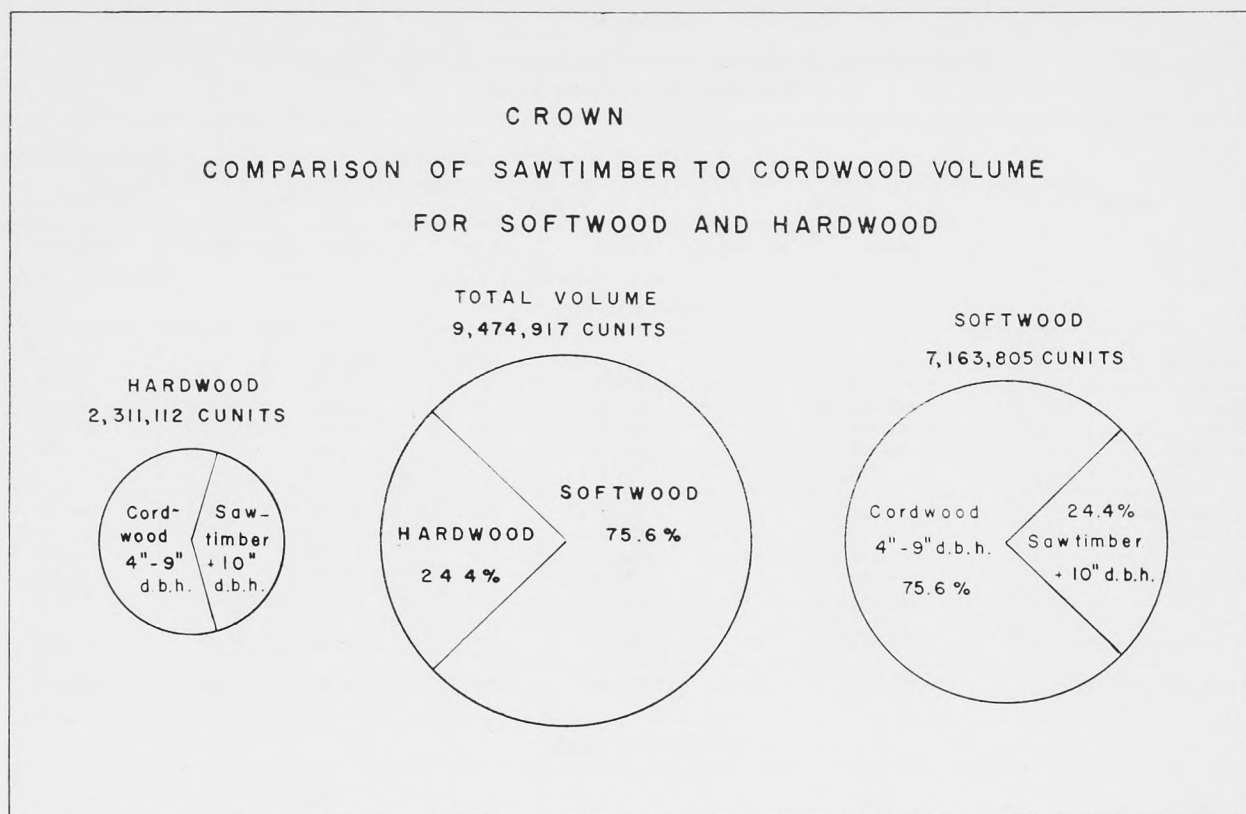


Figure 7.

Forest Section include muskrat, squirrel, beaver, weasel, mink, fisher, otter, lynx, wolf and fox.

Moose, whitetail deer, and a few woodland caribou are found. The occurrence of wild rice has made some of the lakes of importance for migrating waterfowl. The Alf Hole Wild Goose Sanctuary is located at Rennie.

The lakes and rivers of the Whiteshell, the Winnipeg River, and Aikens Lake are favorite sports fishing areas. Among native fish taken are pickerel, northern pike, lake trout, mooneye, and sturgeon. A trout hatchery has been in operation at West Hawk Lake since 1943. This hatchery produces lake, brown, speckled and rainbow trout for distribution to sports fishing waters throughout the province. Hunt Lake in the Whiteshell has been stocked with splake, a new hybrid fish cultured at the local hatchery.

Most of the wild rice crop of Manitoba is harvested from this area, the average annual crop amounting to several hundred thousand pounds.

The Winnipeg River Forest Section like other areas in the Precambrian is well suited for recrea-

tional development and its proximity to Winnipeg and to the United States gives it an advantage over similar areas further north. About twenty different

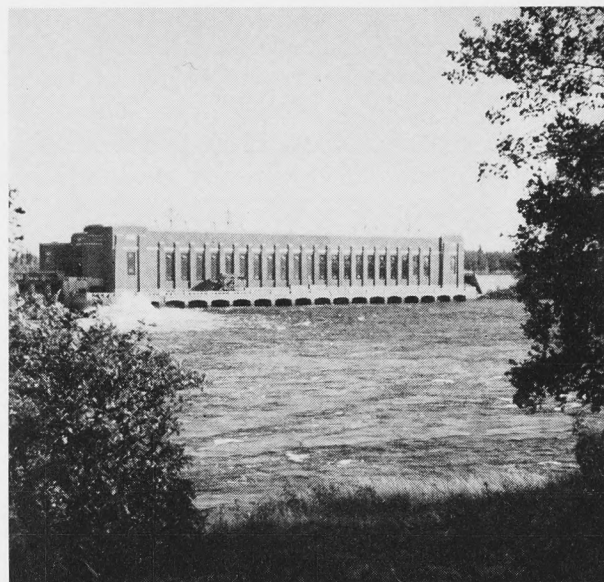


Photo courtesy City of Winnipeg Hydro Electric System
City of Winnipeg Hydro Electric plant at Point du Bois,
Winnipeg River.

lakes in the Whiteshell alone have been developed as summer resorts, and the total number of occupied lots is about 2,150. Other recreational areas include Lac du Bonnet, the lower Winnipeg River, and Oiseau River.

Forest Administration

A fire-rangin staff was organized by the Department of Interior in 1908. In the early years fire patrol of necessity had to be done by canoe since roads and trails were practically nonexistent. In 1921 the Canada Air Board established a seaplane

station at Victoria Beach, thus initiating the use of aircraft for fire detection and transportation of suppression crews and equipment. The air base was shortly afterward moved to Lac du Bonnet.

Reconnaissance survey parties covered the area north of the Winnipeg River in 1914 and 1915 but were handicapped by difficulty of access and lack of aerial photographs. Further forest surveys were made in 1921 covering the Maskwa, O'Hanley, Black and Bird River watersheds in connection with a pulpwood berth application.

Table 7
Cubic Foot Volume per Acre—Softwood and Hardwood by Age Classes and Cover Types—Winnipeg River Forest Section

| Age class years | VOLUMES IN CUBIC FEET PER ACRE BY COVER TYPE | | | | | | | | | | | | | | |
|------------------------|--|-----------|-------|-----------|-----------|-------|-----------|-----------|-------|-----------|-----------|-------|-----------|-----------|-------|
| | S | | | M | | | N | | | H | | | Total | | |
| | Soft-wood | Hard-wood | Total | Soft-wood | Hard-wood | Total | Soft-wood | Hard-wood | Total | Soft-wood | Hard-wood | Total | Soft-wood | Hard-wood | Total |
| CROWN LANDS | | | | | | | | | | | | | | | |
| 0 - 20..... | | | | | | | | | | | | | | | |
| 21 - 40..... | 166 | 13 | 179 | 208 | 87 | 295 | 195 | 198 | 393 | 34 | 220 | 254 | 164 | 78 | 242 |
| 41 - 60..... | 666 | 76 | 742 | 720 | 376 | 1,096 | 488 | 336 | 824 | 125 | 686 | 811 | 496 | 378 | 874 |
| 61 - 80..... | 724 | 54 | 778 | 609 | 205 | 814 | 479 | 456 | 935 | 183 | 793 | 976 | 651 | 157 | 808 |
| 81 - 100..... | 1,113 | 40 | 1,153 | 854 | 321 | 1,175 | 547 | 505 | 1,052 | 262 | 1,011 | 1,273 | 1,019 | 143 | 1,162 |
| 101 - over..... | 1,102 | 36 | 1,138 | 545 | 192 | 737 | 1,178 | 775 | 1,953 | 178 | 664 | 842 | 1,032 | 63 | 1,095 |
| MERCHANTABLE..... | 772 | 49 | 821 | 655 | 289 | 944 | 429 | 348 | 777 | 144 | 707 | 851 | 636 | 205 | 841 |
| PRODUCTIVE FOREST..... | 629 | 40 | 669 | 575 | 254 | 829 | 422 | 343 | 765 | 133 | 652 | 785 | 542 | 175 | 717 |
| PATENTED LANDS | | | | | | | | | | | | | | | |
| 0 - 20..... | | | | | | | | | | | | | | | |
| 21 - 40..... | 290 | 19 | 309 | 79 | 28 | 107 | 321 | 424 | 745 | 14 | 123 | 137 | 138 | 113 | 251 |
| 41 - 60..... | 2,154 | 141 | 2,295 | 440 | 144 | 584 | 300 | 400 | 700 | 83 | 378 | 461 | 1,289 | 203 | 1,492 |
| 61 - 80..... | 353 | 24 | 377 | 1,135 | 582 | 1,717 | 1,100 | 740 | 1,840 | 260 | 956 | 1,216 | 338 | 727 | 1,065 |
| 81 - 100..... | 181 | 1 | 182 | | | | | | | 288 | 985 | 1,273 | 185 | 36 | 221 |
| 101 - over..... | | | | | | | | | | | | | | | |
| MERCHANTABLE..... | 1,101 | 69 | 1,170 | 217 | 81 | 298 | 334 | 429 | 763 | 155 | 604 | 759 | 572 | 240 | 812 |
| PRODUCTIVE FOREST..... | 555 | 35 | 590 | 55 | 21 | 76 | 334 | 429 | 763 | 69 | 271 | 340 | 230 | 97 | 327 |
| ALL LANDS | | | | | | | | | | | | | | | |
| 0 - 20..... | | | | | | | | | | | | | | | |
| 21 - 40..... | 166 | 13 | 179 | 200 | 84 | 284 | 197 | 201 | 398 | 34 | 217 | 251 | 163 | 79 | 242 |
| 41 - 60..... | 681 | 77 | 758 | 719 | 375 | 1,094 | 488 | 336 | 824 | 124 | 685 | 809 | 500 | 377 | 877 |
| 61 - 80..... | 724 | 54 | 778 | 609 | 206 | 815 | 479 | 456 | 935 | 184 | 795 | 979 | 651 | 158 | 809 |
| 81 - 100..... | 1,108 | 40 | 1,148 | 854 | 321 | 1,175 | 547 | 505 | 1,052 | 263 | 1,010 | 1,273 | 1,015 | 142 | 1,157 |
| 101 - over..... | 1,102 | 36 | 1,138 | 545 | 192 | 737 | 1,178 | 775 | 1,953 | 178 | 664 | 842 | 1,032 | 63 | 1,095 |
| MERCHANTABLE..... | 773 | 49 | 822 | 652 | 288 | 940 | 428 | 349 | 777 | 144 | 706 | 850 | 636 | 205 | 841 |
| PRODUCTIVE FOREST..... | 629 | 40 | 669 | 563 | 249 | 812 | 422 | 343 | 765 | 132 | 646 | 778 | 539 | 174 | 713 |

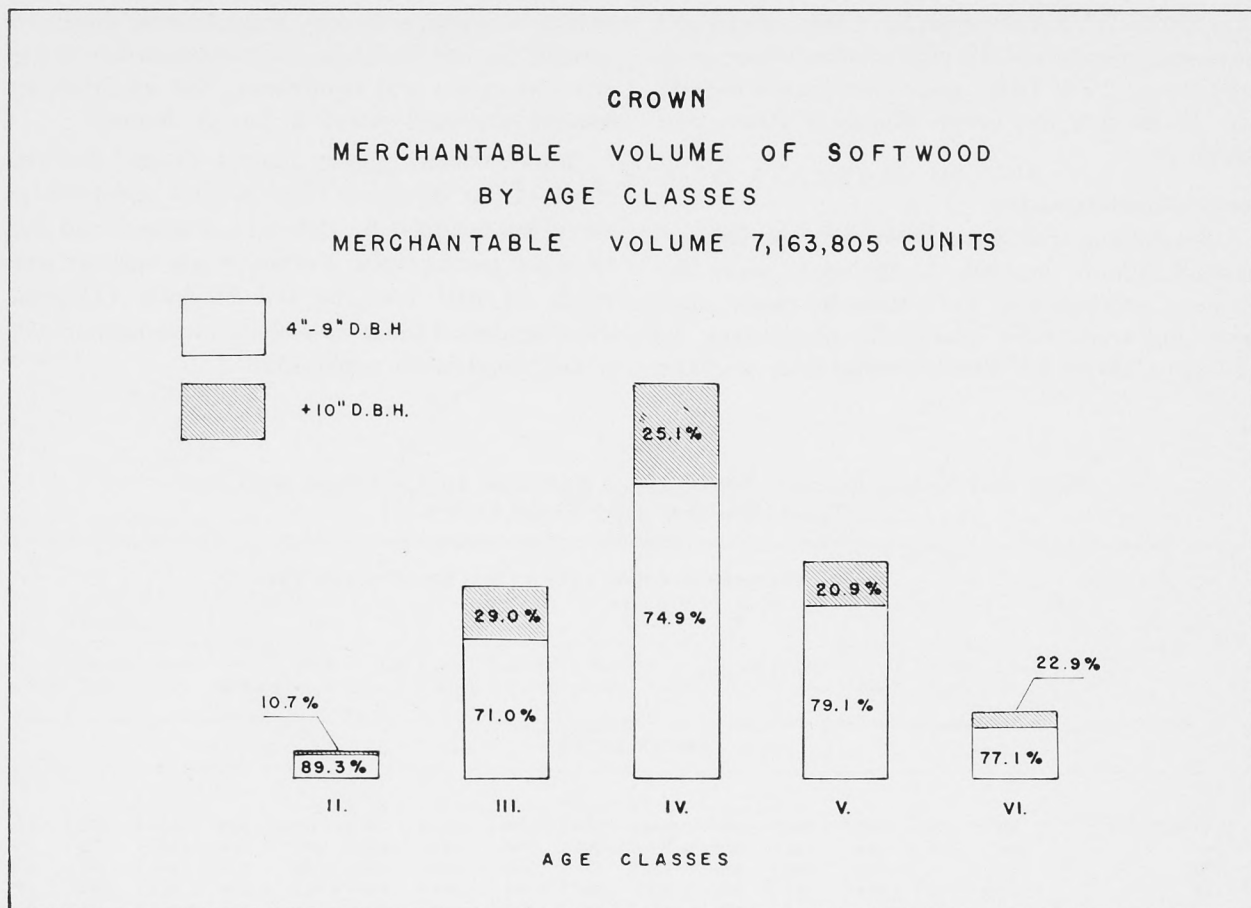


Figure 8.

It was not until 1926 when aerial photographic coverage had been obtained that it became possible to map the topography and timber types of the area with anything approaching accuracy. Five cruising parties were in the field during 1926 and 1927 in connection with the selection of blocks for Pulpwood Berth No. 1, and with the assistance of the photographs estimates of timber volume and areas of forest types were obtained for the whole area north of the Winnipeg River. No cruising was done in the Whiteshell Forest Reserve at that time.

With the transfer of the natural resources to the Province in 1930 a considerable reorganization of forest administration took place, the administration of timber disposal, fire protection and other phases of forestry being combined under the Forest Service, Department of Mines and Natural Resources. Since then forestry administrative sites have been established at Falcon Lake, West Hawk, Rennie, Seven Sisters, Lac du Bonnet and Pine Falls; and

eleven steel lookout towers have been built, each connected by telephone line, by radio, or both. The main air base for the Manitoba Government Air Service was established at Lac du Bonnet in 1933, and has become an important agent in fire detection and suppression as well as in general transportation and supervision of cruising and timber operations.

The Whiteshell Forest Reserve was established in 1931 and has gradually increased in importance as recreational facilities were developed.

The area covered by this report includes the Whiteshell Forest District under a Forester with headquarters at Rennie, and part of the Eastern Forest District under a District Forester with an office in Winnipeg. The Forest Ranger districts included are—West Hawk, Rennie, Seven Sisters, which are under Whiteshell administration; and Lac du Bonnet, Pine Falls and Lake Winnipeg East, which are part of the Eastern Forest District.

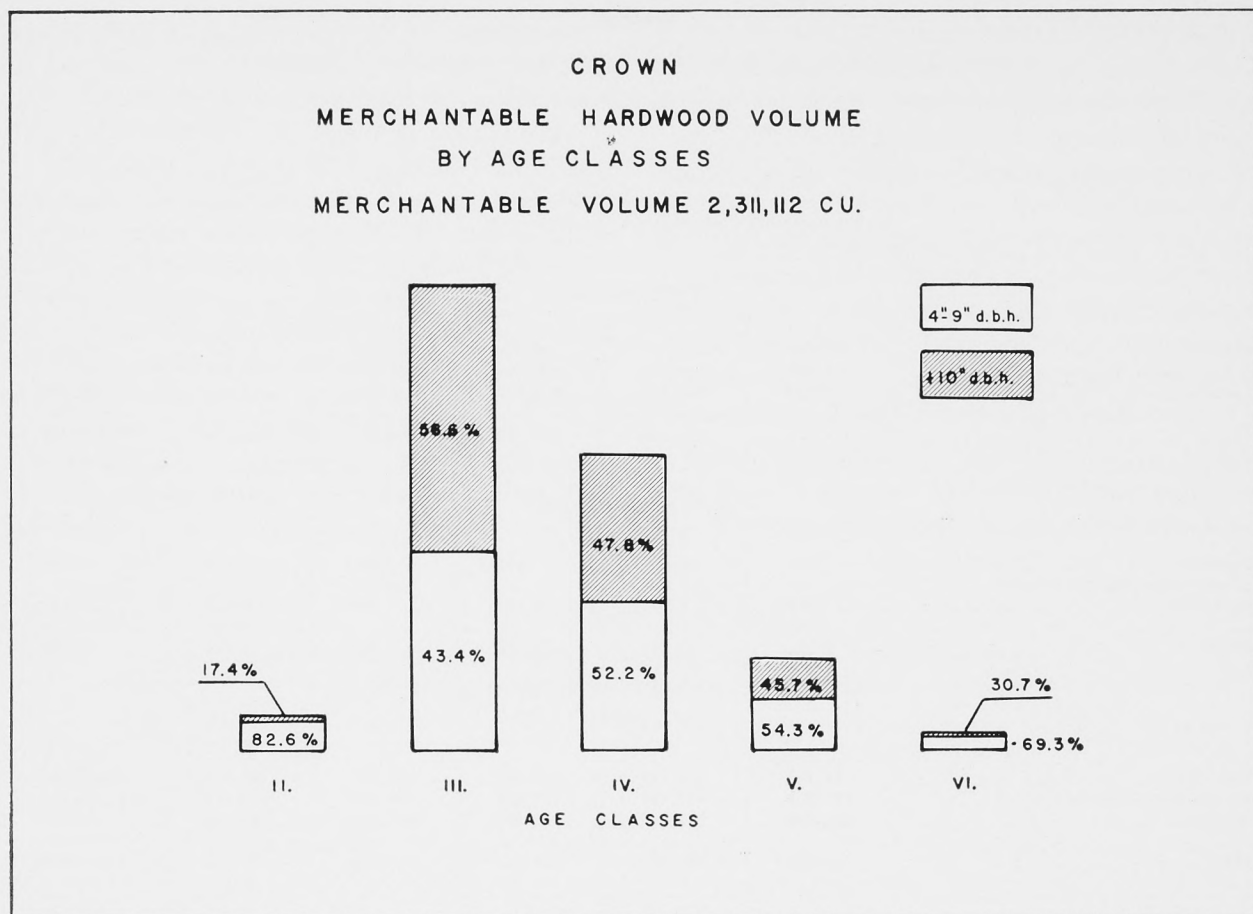


Figure 9.

Area Classification and Forest Composition

Of the total land area in the Winnipeg River Forest Section, 51.2 per cent has been classified as productive forest land and 13.4 per cent as potentially productive land, or a total of 64.6 per cent capable of producing timber crops—see Table 1. The percentage of land classed as potentially productive is considerably higher than in any of the other Forest Sections. In explanation it might be pointed out that the general class “potentially productive” includes the subclasses “Burn,” “Brush” and “Grassland.” The subclass “Burn” has been mapped mainly in the northern and eastern parts of the Forest Section, the type interpretation being based mostly on aerial photographs. More recent field examinations indicate that a very considerable proportion of the “Burn” is actually restocked and, therefore, would on a more intensive inventory be classed as “young growth” and come under the general heading “productive forest.”

Table 2 shows the relatively high percentage of softwood. The combined “S” and “M” cover types (50-100% softwood) make up 80 per cent of the productive forest area, leaving 20 per cent for the combined “N” and “H” cover types (0-50% softwood).

Considering volume by species, jack pine leads, followed by black spruce, aspen, and white spruce, in that order—see Table 6. The high percentage of jack pine is no doubt the result of large fires of the year 1929 and earlier.

Reference is made to Tables 1 to 7 which give area and volume data for the whole Forest Section and to Tables 8 to 12 giving similar information by subsections.

Forest Inventory

In the Winnipeg River Forest Section sufficient control for aerial photographs was available from base lines; provincial boundary, and certain town-

Table 8
Area Classification by Subsections—Winnipeg River Forest Section

| Subsections | LAND CLASSES IN ACRES | | | | | |
|---------------------------------------|-----------------------|--------------|------------------------|-----------------------|-------------------------------|------------|
| | Productive forest | | Potentially Productive | Non-Productive Forest | Permanently Non forested Land | Total land |
| | Unmerchantable | Merchantable | | | | |
| CROWN LANDS | | | | | | |
| Whiteshell..... | 77,717 | 332,181 | 6,013 | 129,590 | 43,700 | 589,201 |
| Pulpwood berths (Blocks 1 and 2)..... | 17,305 | 619,253 | 137,692 | 144,190 | 237,105 | 1,155,545 |
| Other lands..... | 100,849 | 174,415 | 200,797 | 244,547 | 112,999 | 833,607 |
| TOTAL..... | 195,871 | 1,125,849 | 344,502 | 518,327 | 393,804 | 2,578,353 |
| PATENTED LANDS | | | | | | |
| Whiteshell..... | 375 | 1,961 | 981 | 927 | 994 | 5,238 |
| Pulpwood berths (Blocks 1 and 2)..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Other lands..... | 6,840 | 2,912 | 3,391 | 436 | 6,821 | 20,400 |
| TOTAL..... | 7,215 | 4,873 | 4,372 | 1,363 | 7,815 | 25,638 |
| ALL LANDS | | | | | | |
| Whiteshell..... | 78,092 | 334,142 | 6,994 | 130,517 | 44,694 | 594,439 |
| Pulpwood berths (Blocks 1 and 2)..... | 17,305 | 619,253 | 137,692 | 144,190 | 237,105 | 1,155,545 |
| Other lands..... | 107,689 | 177,327 | 204,188 | 244,983 | 119,820 | 854,007 |
| TOTAL..... | 203,086 | 1,130,722 | 348,874 | 519,690 | 401,619 | 2,603,991 |

ship, and range lines previously established. Section lines had also been run in the Whiteshell, along the Winnipeg River, and up the shore of Lake Winnipeg.

The inventory was based on vertical photography mostly at a scale of 1:15,840. The central area including the Pulpwood Berth was photographed in 1941, the Whiteshell in 1949 and the northern fringe in 1948 (1:31,680).

The Manitoba Paper Company did the base mapping for their own berth and adjoining areas north of the Winnipeg River, while the Whiteshell Forest Reserve was done by the Forest Service. The Manitoba Paper Company berth, as it was prior to consolidation, was cruised by Company personnel in the winter and summer of 1947 and the extensions to the berth were checked in 1950. The Whiteshell Forest Service was cruised by the Forest Service in 1952.

Tree volume and stand volume tables as prepared by the Manitoba Paper Company were used in the

Pulpwood Berth and adjoining areas while Forest Service tables based on Whiteshell data were used in the Whiteshell and certain other areas. A general stand volume table based on 895 sample plots of one-fifth acre tallied in the Whiteshell is given in Table 13. Photo interpretation and forest mapping for the Forest Section was completed in 1954.

Compilation of estimates by Working Circles was completed in 1954 but the summaries of area and volume data for Subsections and for the whole Forest Section were not completed until March, 1956.

A general description of methods used in the Provincial Inventory is given in the Appendix.

Forest Utilization and Working Plans

The Winnipeg River Forest Section is estimated to contain 1,682,682 acres of land which is either growing forest crops or is capable of growing them, this total amounting to 64.6 per cent of the net land area—see Table 1. Since agricultural, industrial or

recreational development is unlikely to materially reduce this area it becomes necessary to plan future development on the basis of a sustained yield of forest crops.

This Forest Section is well located with regard to markets for forest products. Highway construction has already opened up much of the area to all-weather traffic and new roads are being planned—see Map 2 which shows main roads in red. Water transportation is also possible on Lake Winnipeg, the Winnipeg River and tributary streams, and has been used considerably in the past. At the present time a large part of the pulpwood cut by the Manitoba Paper Company is driven down the Maskwa and Winnipeg Rivers to the mill at Pine Falls.

The demand for spruce pulpwood by the mills at Pine Falls and at Kenora, Ontario, creates a ready market for all the pulpwood which the district can supply. The same applies to the demand for spruce lumber by the market in Greater Winnipeg and the Red River Valley. Jack pine ties have been cut in the past in large quantities along the Winnipeg River and in the Whiteshell, and there is a steady demand for this product. This district supplied hydro line poles for Manitoba's rural electrification program and will continue to supply poles for maintenance of both power and telephone lines.

Poplar of saw-timber size is always in demand and there is a certain amount of poplar pulpwood cut. There is a field, however, for an industry based

Table 9
Area Classification of Productive Forest by Subsections, Cover Types and Merchantability—Winnipeg River Forest Section

| Subsections | AREA IN ACRES | | | | | | | | | |
|--|---------------|---------|----------|---------|----------|--------|----------|---------|-----------|-----------|
| | S | | M | | N | | H | | Total | |
| | Unmerch. | Merch. | Unmerch. | Merch. | Unmerch. | Merch. | Unmerch. | Merch. | Unmerch. | Merch. |
| CROWN LANDS | | | | | | | | | | |
| Whiteshell..... | 70,030 | 160,994 | 4,657 | 65,055 | ..... | 46,154 | 3,030 | 59,978 | 77,717 | 332,181 |
| Pulpwood berths (Blocks 1 and 2)..... | 11,096 | 403,031 | 4,291 | 89,702 | ..... | 45,506 | 1,918 | 81,014 | 17,305 | 619,253 |
| Other lands..... | 74,481 | 123,699 | 16,856 | 30,974 | 1,457 | 5,584 | 8,055 | 14,158 | 100,849 | 174,415 |
| SUBTOTAL..... | 155,607 | 687,724 | 25,804 | 185,731 | 1,457 | 97,244 | 13,003 | 155,150 | 195,871 | 1,125,849 |
| TOTAL..... | 843,331 | | 211,535 | | 98,701 | | 168,153 | | 1,321,720 | |
| PATENTED LANDS | | | | | | | | | | |
| Whiteshell..... | 344 | 430 | 15 | 735 | ..... | 3 | 16 | 793 | 375 | 1,961 |
| Other lands..... | 1,633 | 1,580 | 3,584 | 498 | ..... | 296 | 1,623 | 538 | 6,840 | 2,912 |
| SUBTOTAL..... | 1,977 | 2,010 | 3,599 | 1,233 | ..... | 299 | 1,639 | 1,331 | 7,215 | 4,873 |
| TOTAL..... | 3,987 | | 4,832 | | 299 | | 2,970 | | 12,088 | |
| ALL LANDS | | | | | | | | | | |
| Whiteshell..... | 70,374 | 161,424 | 4,672 | 65,790 | ..... | 46,157 | 3,046 | 60,771 | 78,092 | 334,142 |
| Pulpwood berths (Blocks 1 and 2)..... | 11,096 | 403,031 | 4,291 | 89,702 | ..... | 45,506 | 1,918 | 81,014 | 17,305 | 619,253 |
| Other lands..... | 76,114 | 125,279 | 20,440 | 31,472 | 1,457 | 5,880 | 9,678 | 14,696 | 107,689 | 177,327 |
| SUBTOTAL..... | 157,584 | 689,734 | 29,403 | 186,964 | 1,457 | 97,543 | 14,642 | 156,481 | 203,086 | 1,130,722 |
| TOTAL..... | 847,318 | | 216,367 | | 99,000 | | 171,123 | | 1,333,808 | |

CROWN MERCHANTABLE VOLUME BY SPECIES

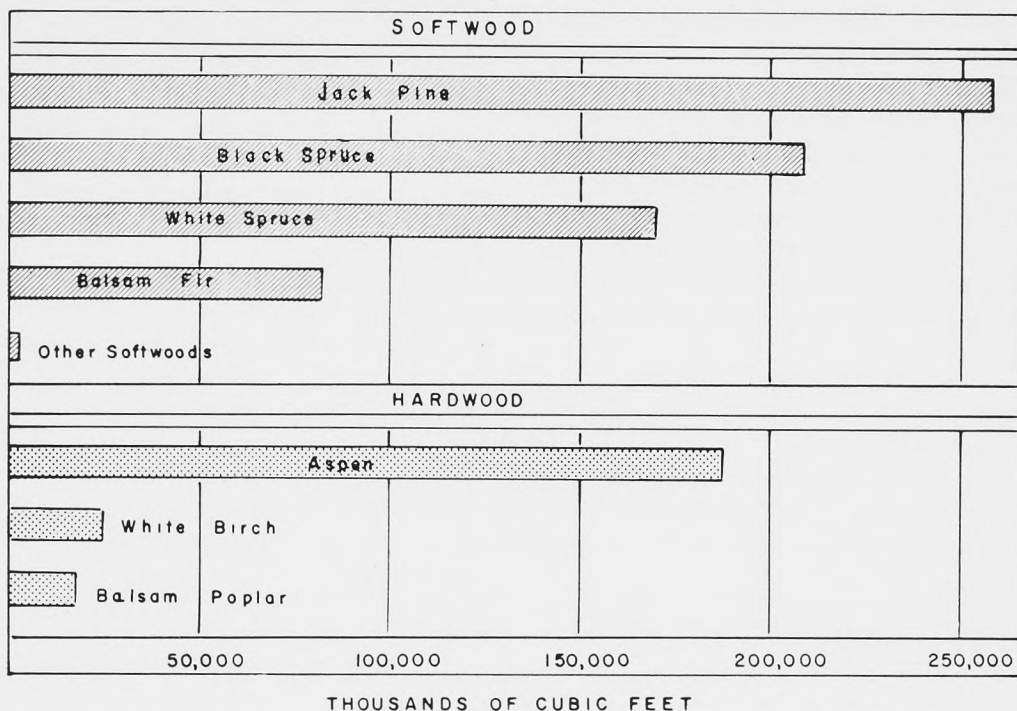


Figure 10.



Shoreline—Brereton Lake.

on poplar utilizing the larger logs as lumber or plywood and the smaller logs as pulpwood.

Due to complications resulting from the inclusion of part of a pulpwood berth within the area, the fact that the Whiteshell Forest Reserve is included in a separate administrative district, and because some of the Forest Ranger districts cover both sides of the Winnipeg River, it has not been possible to make the Working Circles agree in all cases with the Forest Ranger district boundaries.

Tables 8 to 12, inclusive, show inventory figures by subsections and not by Working Circles. The Whiteshell Subsection includes West Hawk, Rennie and Seven Sisters Working Circles; the pulpwood Berth includes Blocks Nos. 1 and 2; Other Lands includes Lac du Bonnet north of the Winnipeg River, Aikens-Flintstone which is the area east and

Table 10
*Softwood and Hardwood Volume by Size Classes and Subsections—
Winnipeg River Forest Section*

| Subsections | VOLUME IN CUNITS (100 cu. ft. Units) | | | | | |
|---------------------------------------|--------------------------------------|------------------|------------------|----------------|------------------|------------------|
| | Softwood | | Hardwood | | Total | |
| | 4" - 9" | 10" + | 4" - 9" | 10" + | 4" - 9" | 10" + |
| CROWN LANDS | | | | | | |
| Whiteshell..... | 1,238,782 | 413,026 | 548,218 | 253,403 | 1,787,000 | 666,429 |
| Pulpwood berths (Blocks 1 and 2)..... | 3,600,562 | 1,168,245 | 689,977 | 651,334 | 4,290,539 | 1,819,579 |
| Other lands..... | 575,708 | 167,482 | 121,711 | 46,469 | 697,419 | 213,951 |
| TOTAL..... | 5,415,052 | 1,748,753 | 1,359,906 | 951,206 | 6,774,958 | 2,699,959 |
| PER CENT | 75.6 | 24.4 | 58.8 | 41.2 | 71.5 | 28.5 |
| PATENTED LANDS | | | | | | |
| Whiteshell..... | 2,880 | 957 | 4,097 | 2,707 | 6,977 | 3,664 |
| Other lands..... | 16,230 | 7,802 | 2,754 | 2,150 | 18,984 | 9,952 |
| TOTAL..... | 19,110 | 8,759 | 6,851 | 4,857 | 25,961 | 13,616 |
| PER CENT..... | 68.6 | 31.4 | 58.5 | 41.5 | 65.6 | 34.4 |
| ALL LANDS | | | | | | |
| Whiteshell..... | 1,241,662 | 413,983 | 552,315 | 256,110 | 1,793,977 | 670,093 |
| Pulpwood berths (Blocks 1 and 2)..... | 3,600,562 | 1,168,245 | 689,977 | 651,334 | 4,290,539 | 1,819,579 |
| Other lands..... | 591,938 | 175,284 | 124,465 | 48,619 | 716,403 | 223,903 |
| TOTAL..... | 5,434,162 | 1,757,512 | 1,366,757 | 956,063 | 6,800,919 | 2,713,575 |
| PER CENT..... | 75.6 | 24.4 | 58.8 | 41.2 | 71.5 | 28.5 |

Table 11
*Softwood and Hardwood Volume by Land Tenure and Subsections—
Winnipeg River Forest Section*

| Subsections | VOLUMES IN 100 CUBIC FOOT UNITS (Cunits) | | | | | | | | |
|---------------------------------------|--|------------------|------------------|---------------|---------------|---------------|------------------|------------------|------------------|
| | Crown | | | Patented | | | Total | | |
| | Softwood | Hardwood | Total | Softwood | Hardwood | Total | Softwood | Hardwood | Total |
| Whiteshell..... | 1,651,808 | 771,028 | 2,422,836 | 3,837 | 6,781 | 10,618 | 1,655,645 | 777,809 | 2,433,454 |
| Pulpwood berths (Blocks 1 and 2)..... | 4,768,807 | 1,380,999 | 6,149,806 | ..... | ..... | ..... | 4,768,807 | 1,380,999 | 6,149,806 |
| Other lands..... | 743,190 | 159,085 | 902,275 | 24,032 | 4,927 | 28,959 | 767,222 | 164,012 | 931,234 |
| TOTAL..... | 7,163,805 | 2,311,112 | 9,474,917 | 27,869 | 11,708 | 39,577 | 7,191,674 | 2,322,820 | 9,514,494 |
| PER CENT..... | 75.6 | 24.4 | 100.0 | 70.4 | 29.6 | 100.0 | 75.6 | 24.4 | 100.0 |

Table 12

Softwood and Hardwood Volume per Acre Merchantable Area by Land Tenure, Cover Type and Subsections—Winnipeg River Forest Section

| Subsection | VOLUME PER ACRE IN CUBIC FEET | | | | | | | | |
|---------------------------------------|-------------------------------|----------|-------|----------|----------|-------|----------|----------|-------|
| | Crown | | | Patented | | | Total | | |
| | Softwood | Hardwood | Total | Softwood | Hardwood | Total | Softwood | Hardwood | Total |
| Whiteshell..... | 497 | 232 | 729 | 195 | 346 | 541 | 495 | 233 | 728 |
| Pulpwood berths (Blocks 1 and 2)..... | 770 | 223 | 993 | ..... | ..... | ..... | 770 | 223 | 993 |
| Other lands..... | 426 | 91 | 517 | 825 | 169 | 994 | 433 | 92 | 525 |
| AVERAGE..... | 636 | 205 | 841 | 572 | 240 | 812 | 636 | 205 | 841 |

north of the Pulpwood Berth, also miscellaneous areas of licensed berth, Crown and patented lands. Separate tables have been prepared for each of these Working Circles but these are not included in this report.

A preliminary working plan was prepared for the Whiteshell Forest Reserve in 1951 and a figure was set for the annual allowable cut. This plan was based on ground surveys during the period 1946-49, inclusive. Some adjustments were made after the inventory survey of 1952 and a new plan will be adopted after the completion of the more intensive survey now in progress.

A working plan submitted by the Manitoba Paper Company covering Pulpwood Berth No. 1 including Blocks 1 and 2 in the Winnipeg River Forest Section and Blocks 3 and 4 in the Lowlands South and Nelson River Forest Sections was approved by the Minister in April, 1957. This plan was based on the inventory described in this report and on a study of wood supplies from other sources, transportation, mill requirements, etc.

Reforestation

The establishment of a new forest on burned-over and cut-over areas is a requisite of sustained yield management. Field studies with the object of



Beach scene, Falcon Lake, Whiteshell Forest Reserve.

Photo courtesy Winnipeg Free Press

Table 13
General Stand Volume Table—Whiteshell Forest Reserve
(Data from Final Set of Curves)

| Height class | DENSITY CLASSES (In square feet of basal area per acre at breast height) | | | | | | | |
|--------------------|---|----------------|----------------|----------------|-----------------|------------------|------------------|------------------|
| | A 0' - 20' | B 20' - 40' | C 40' - 60' | D 60' - 80' | E 80' - 100' | F 100' - 120' | G 120' - 140' | H 120' - 140' |
| | VOLUME IN CUNITS PER ACRE (100 cu. ft. Units) | | | | | | | |
| 4 (30' - 40')..... | 0.65 | 2.85 | 5.10 | 7.25 | 9.50 | 11.70 | ..... | ..... |
| 5 (40' - 50')..... | 1.20 | 4.35 | 7.55 | 10.70 | 13.90 | 17.00 | 20.20 | ..... |
| 6 (50' - 60')..... | 1.75 | 5.90 | 10.05 | 14.15 | 18.30 | 22.40 | 26.45 | ..... |
| 7 (60' - 70')..... | ..... | 7.40 | 12.50 | 17.50 | 22.65 | 27.75 | 32.80 | 38.00 |
| 8 (70' - 80')..... | ..... | 8.90 | 15.00 | 21.00 | 28.10 | 33.15 | 39.15 | 45.30 |
| 9 (80' - 90')..... | ..... | ..... | ..... | 24.40 | 31.40 | 38.45 | 45.40 | 52.55 |

Volumes refer to Gross Round Wood Volume to 3" top and 12" stump.
Table based on 895 one-fifth acre plots measured in the field.

finding out how successful natural regeneration is under different conditions of site have been made and certain tentative conclusions have been arrived at. In general, black spruce in the moister sites has been found to successfully reproduce itself after either fire or cutting, and the same may be said of poplar and birch in all sites. Jack pine will regenerate after fire but usually fails after cutting. White spruce will regenerate under certain conditions after fire or logging, but, in the latter case, the percentage of balsam fir is apt to increase. In general, all forest types usually produce a new tree crop after a single disturbance by fire or cutting, although

the new crop in some cases is of an inferior species. Repeated disturbance, such as a series of fires or fire after logging, may cause the area to restock to brush or grass.

Artificial reforestation by planting or seeding has not been practised to any appreciable extent in this Forest Section. A total of 107,000 transplants were set out in the Whiteshell during 1956 and 1957. The intention is to plant white spruce and red pine in certain accessible areas where natural regeneration has failed. The Manitoba Paper Company have also established a few experimental plots.

Appendix

SURVEY METHODS

Ground Control

Ground control for aerial photographs was obtained mainly from base lines, township outlines, and subdivision surveys established either before or during the progress of the forest inventory. The distance between control lines varied from one mile in the southern part to as much as 72 miles in the north. In certain cases it was necessary to make traverses of winter roads, lakes and rivers in order to fill in blanks where cadastral surveys were lacking.

Air Photography

The photographs on which the inventory was based were summer verticals varying in scale from 1:15,840 to 1:36,000, taken mainly in the period 1946 to 1953 inclusive.

Base Mapping

The slotted template lay-down method of base mapping was used. A base map consisted simply of a large sheet of paper showing township grids on which were located the primary and secondary control points of the photographs covering the area.

Field Surveys

The type classification used in this survey was an adaptation of the system developed by S. T. B. Losee of the Abitibi Power and Paper Company. Types were differentiated by species, composition, height, density, site and sub-type, the following breakdown being employed:

- (a) *Cover-type*
 - S : 75-100% conifers by basal area
 - M : 50- 75% conifers by basal area
 - N : 25- 50% conifers by basal area
 - H : 0- 25% conifers by basal area
- (b) *Height Class*
 - 1 : Average height of main stand 0-10 feet
 - 2 : Average height of main stand 10-20 feet
 - 3 : Average height of main stand 20-30 feet
 - Etc.
- (c) *Density Class*
 - A : 0-20 square feet per acre basal area
 - B : 20-40 square feet per acre basal area
 - C : 40-60 square feet per acre basal area
 - Etc.
- (d) *Site*
 - V₁ : Jack pine ridge top
 - V₂ : Black spruce ridge top
 - W : Hardwood upper slope
 - X₁ : Black spruce lower slope
 - X₂ : Mixed lower slope
 - Y₁ : Jack pine flat
 - Y₂ : Poplar flat
 - Z₁ : Wet flat (black spruce)
 - Z₂ : Cedar flat
- (e) *Sub-type*
 - 1 : 0- 12% of conifer basal area jack pine
 - 2 : 13- 37% of conifer basal area jack pine
 - 3 : 38- 62% of conifer basal area jack pine
 - 4 : 63- 87% of conifer basal area jack pine
 - 5 : 88-100% of conifer basal area jack pine

The above sub-types were used in conjunction with all four cover-type symbols—S, M, N, and H, depending on the percentage of jack pine in the coniferous portion of the stand. Additionally, in the S cover-type there might be tamarack sub-types. These were shown by the suffixes L1, L2, L3, L4 and L5, denoting the same percentage of tamarack volume as the first suffixes did for jack pine.

The term type-aggregate has been used as referring to all types in a Forest Section which have

common characteristics as to cover-type, height, density, site and sub-type. For example, the symbol "S7EX₁-1" denotes a type with 75-100 per cent of the basal area in coniferous species, average height 60-70 feet, basal area per acre 80 to 100 square feet, growing on a lower slope site and mainly black spruce, with a jack pine composition less than 12 per cent of the coniferous basal area.

Sampling was distributed as widely as possible over the total inventory area, the twin objectives being to obtain sufficient data for local tree and type-aggregate volume tables, and to familiarize the photo-interpreters with the varying stand conditions to be found in different localities.

Sampling was by means of one-fifth-acre plots (one-quarter chain wide by eight chains long) established at fixed intervals along cruise lines selected by the party chief. In order to obtain a well-distributed sample of all type-aggregates, the party chiefs were instructed to sample as many type aggregates as possible from each camp site, and not to take too many plots in one particular type in the same general area. Information recorded on each plot included the cover-type, site class, tally by species of all trees over 3.5 inches D.B.H., and four height-age measurements of representative trees. Notes were also made on the topography, soil and young growth, minor vegetation and the general condition of the stand. Sufficient form class measurements were made to determine for each species the relationship between form class, diameter, height and site. Special notes were made on young growth areas.

Forest Maps

The location of all boundary lines between the various forest types was determined almost entirely from examination of the photographs with the aid of a stereoscope.

After photo interpretation, both forestry and planimetric information was transferred from the photos to the base maps by means of either a Sketchmaster or Seelyscope. The areas of the various forest strata were determined either by dot count or by measurement with a planimeter.

Each finished forestry map covers one township at the 1:15,840 scale, or four townships at smaller scales. Ozalid prints of the completed maps were prepared for distribution to district personnel and one master copy of each map was hand-colored for

filing, using the standard colors recommended by the Federal Forestry Branch.

Interpretation and Compilation

After field sampling in a given area was completed, the final photo interpretation was made. Since it is on the quality of this work that the accuracy of the inventory largely depends, an effort was made to have the man most familiar with a particular area make the final photo interpretation for that area. Much of the final interpretation was done in the field by the party chiefs and cruisers at a time when stand conditions as they appeared on both the ground and the photos could readily be compared.

The first step in compilation was the transfer of field data to two sets of summary sheets. The height-age and form class data obtained from measurements of sample trees was used to prepare local tree volume tables, while the data on the tally sheets was the basis for the type-aggregate volume tables.

For each Forest Section, separate tree volume tables were prepared for each species, site and height class. The Dominion Form Class Volume Tables were used in conjunction with the height-age and form class data to prepare the local volume tables. The standard system of harmonizing curves was used.

The next step was the preparation of a general stand volume table showing gross volume per acre, all species combined. Field plot data was segregated by height and density classes regardless of site and cover-type. Using the method of least squares and linear regression a series of straight lines was drawn and later harmonized by the Dwight method. Values read from these lines formed a general stand volume table showing average volume in cunits per acre by height and density classes for the whole Forest Section. See Table No. 13.

The next step was the determination of the proportion of each species in each type-aggregate. This was done by a special method of percentages and curves. Similar methods were used to determine the proportion of the two size classes, four to nine inches D.B.H. and ten inches plus. The percentages as arrived at by harmonizing the curves for each height class were applied to the previously calculated general stand volume table, and the results were tabulated as the final type-aggregate volume table.

Up to this point in compilation, stand age was not considered. However, the large number of height-age measurements obtained in the field made it possible to establish by means of a series of curves, the relationship between site, height and age for each of the major species on each site. Age classes could then be assigned to all type-aggregates. Thus, when the final volume summaries were made, they were subdivided by cover-type and age class only; height, site and density being omitted.

Gross volumes of each individual type were first tabulated in cubic feet by numbered types and later compiled in township units by species, cover-type, age class, size class and land tenure.

In order to express the net rather than the gross volume, a cull factor was established for each species in each Forest Section. This factor was based on a general knowledge of the various species, and notes made by the cruisers regarding defects observed on the sample plots. The cull factor was applied to the gross figures for the Working Circle and not to the smaller units of type and township. See Table 14.

Table 14
Cull Factor by Species—Winnipeg River Forest Section

| <i>Species</i> | <i>Cull per cent</i> |
|--------------------|--------------------------|
| White spruce..... | 5 |
| Black spruce..... | 5 |
| Balsam fir..... | 25 |
| Jack pine..... | 15 |
| Tamarack..... | 10 |
| White cedar..... | 40 |
| Aspen..... | 50 |
| Balsam poplar..... | 40 |
| White birch..... | 40 |

Reports

Fifty-five inventory summaries were compiled for Working Circles or Ranger Districts, each of these units averaging about 1,000 square miles in area. Each summary contains a breakdown of the area and net volume by cover-types and age classes. Subtotals are included for the Crown and patented portions of each unit. Net volumes are expressed in both cunits (100 cu. ft. units) and M ft.b.m. for the ten inch plus diameter group, and in cunits alone for the four to nine inch D.B.H. group. These inventory summaries were totalled by Forest Sections, and a report is being published on the forest resources of each Forest Section.

ROTATION

The length of the rotation depends on the site, the product, the climatic region. Table 15 gives tentative figures for the productive forest area of Manitoba. A range of rotation age is given depending mainly on whether the stand is to be cut for pulpwood or saw timber.

Table 15
Rotation by Species

| <i>Species</i> | <i>years</i> |
|--------------------|--------------|
| White spruce..... | 80 - 120 |
| Black spruce..... | 80 - 140 |
| Balsam fir..... | 60 - 80 |
| Jack pine..... | 60 - 90 |
| Tamarack..... | 70 - 100 |
| Cedar..... | 100 - 200 |
| Aspen poplar..... | 50 - 70 |
| Balsam poplar..... | 50 - 70 |
| White birch..... | 60 - 80 |

ALLOWABLE CUT

A determination of the allowable annual depletion by cutting, fire, etc., is necessary in order that the forest may be kept on a sustained yield basis. The compiled inventory data presents volume by cover-type, age class and species while area is presented by age class and cover-type only. The method of calculation most suitable to the available data is by a volumetric formula.

The simplest formula for finding the annual yield, commonly known as the Von Mantel formula, is as follows:

$$\text{Annual Yield} = \frac{\text{Growing Stock}}{\text{Half the number of years in rotation}}$$

For the same purposes this formula has been modified for calculation of the allowable annual yield. Each species being

calculated separately according to its average rotation age. A deduction of 20 per cent has been made to allow for contingencies such as loss from fire, windfall, insects and disease.

In those areas which have established Working Plans such as the Southeastern Forest Section, the Duck Mountain Forest Reserve, Pulpwood Berth No. 1 and certain portions of the Lowlands South Forest Section, various alternative methods have been used in arriving at the Allowable Cut. It is usual in these cases to secure a more accurate estimate of the Allowable Cut by methods which take into account any unevenness in age class distribution.

★ ★ ★

Common and Botanical Names of Tree Species Included in Timber Estimates

CONIFERS

| | |
|----------------|--|
| White Spruce — | <i>Picea glauca</i> (Moench) Voss |
| Black Spruce — | <i>Picea mariana</i> (Mill) BSP. |
| Balsam fir — | <i>Abies balsamea</i> (L.) Mill |
| Jack pine — | <i>Pinus banksiana</i> Lamb. |
| Tamarack — | <i>Larix laricina</i> (Du Roi) K. Koch |
| Cedar — | <i>Thuja occidentalis</i> L. |

HARDWOODS

| | |
|-----------------|----------------------------------|
| Aspen poplar — | <i>Populus tremuloides</i> Michx |
| Balsam poplar — | <i>Populus balsamifera</i> L. |
| White birch — | <i>Betula papyrifera</i> Marsh. |

DATE DUE SLIP

ROTATION

The length of the rotation depends on the site, the product, the climatic conditions, and to a lesser extent, the climatic conditions. Tentative figures for the province of Manitoba. A range of rotation is given, depending mainly on whether the forest is to be cut for pulpwood or saw timber.

Table
Rotation by

| <i>Species</i> |
|--------------------|
| White spruce..... |
| Black spruce..... |
| Balsam fir..... |
| Jack pine..... |
| Tamarack..... |
| Cedar..... |
| Aspen poplar..... |
| Balsam poplar..... |
| White birch..... |

ALLOWABLE CUT

A determination of the allowable cut by cutting, fire, etc., is the basis for the forest management plan. The compiled inventory data, by cover-type, age class and species, presented by age class and method of calculation most commonly used, is by a volumetric formula.

The simplest formula for the allowable cut is commonly known as the Volume Formula, and is as follows:

$$\text{Annual Yield} = \frac{\text{Growing Stock}}{\text{Half the number of years in rotation}}$$

For general inventory purposes this formula has been used as the basis for calculation of the allowable cut. In the Forest Circles, each species being calculated separately according to its average rotation of 20 per cent has been made to allow for contingencies such as loss from fire, disease.

Forests which have established Working Reserves, in the southeastern Forest Section, the Forest Reserve, Pulpwood Berth and certain portions of the Lowlands South of the Forest Section. Various alternative methods have been used at the Allowable Cut. It is to secure a more accurate estimate of the Allowable Cut by methods which take into account the unevenness in age class distribution.

★ ★ ★

Botanical Names of Trees Included in Timber Estimates

CONIFERS

- Picea glauca* (Moench) Voss
- Picea mariana* (Mill) BSP.
- Abies balsamea* (L.) Mill
- Thuja banksiana* Lamb.
- Larix laricina* (Du Roi) K. Koch
- Thuja occidentalis* L.

HARDWOODS

- Aspen poplar — *Populus tremuloides* Michx
- Balsam poplar — *Populus balsamifera* L.
- White birch — *Betula papyrifera* Marsh.

SD 146 M3 M27 1956 NO-2
MANITOBA FORESTRY BRANCH
FOREST RESOURCES INVENTORY
1956

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SD 146 M3 M27 1956 no.2
Manitoba. Forestry Branch
Forest resources inventory,
1956 :

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